

COMPUTING FOR HOME AND BUSINESS

INTERFACE

AGE™

JULY 1980

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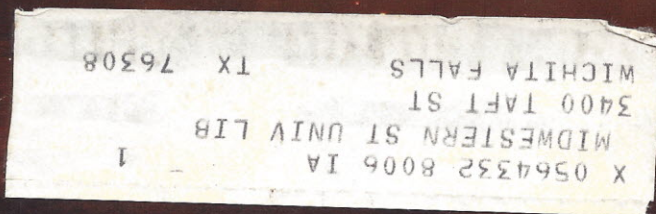
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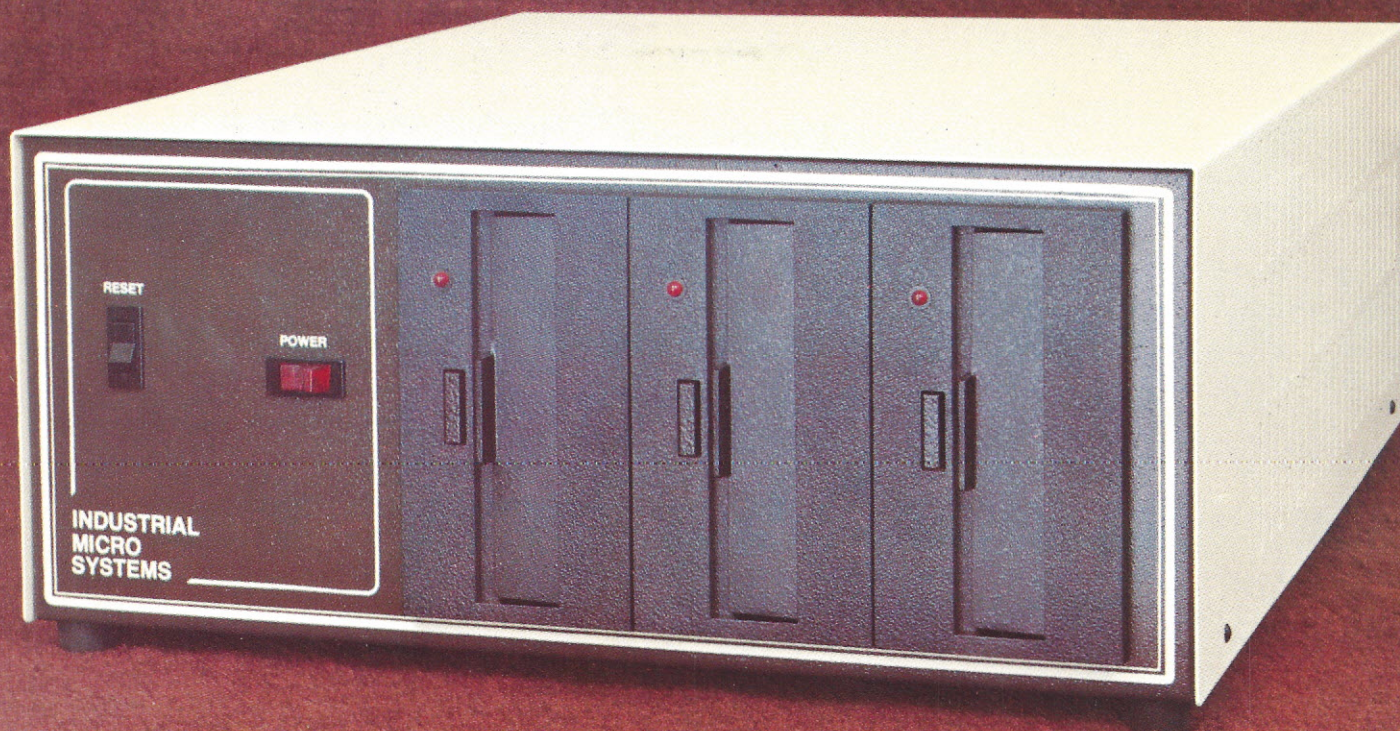
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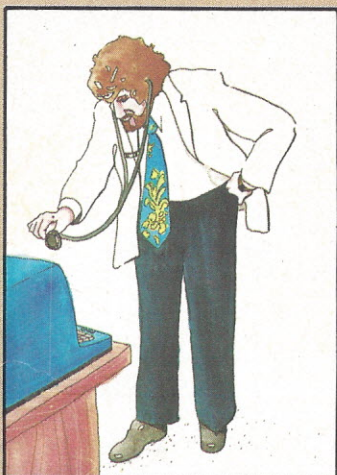
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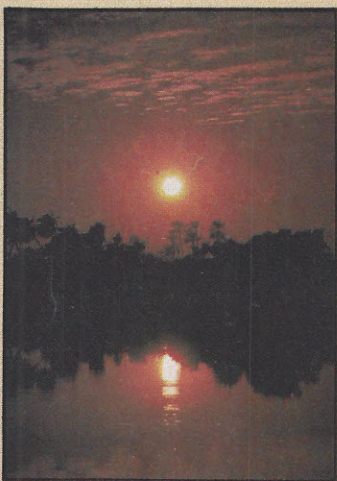
COMPUTING FOR HOME AND BUSINESS APPLICATIONS



Control the Sun . . . Pg. 66



Physician's System . Pg. 72



Cover photo by Don May

GENERAL FEATURES

A Guide to Remote Control Hookups	60
<i>by Chuck Atkinson</i>	
Control the Sun with Your Micro	66
<i>by Dean Carstens</i>	

BUSINESS FEATURES

Parts Inventory Control	70
<i>by Chuck Atkinson</i>	
A Physician's Approach to the Purchase of a Small Office System	72
<i>by James K. Robinson, M.D.</i>	

HARDWARE FEATURES

A High-Resolution Video Board for the S-100 System	74
<i>by Roger Edelson</i>	
System of the Month: MicroDaSys millie	81
<i>by Tom Fox, Systems Editor</i>	

LEARNING CENTER

My TRS-80 Likes Me	88
<i>by Bob Albrecht</i>	

SOFTWARE FEATURES

BASCOM: Microsoft's BASIC Compiler for the 8080/Z-80	124
<i>by Alan R. Miller, Software Editor</i>	
INSULATE: An Insulation Optimization Program	128
<i>by F. Stephen Andes, III and Brian Sher, Londe-Parker-Michels, Inc.</i>	
New Life for TDL's Text Output Processor	138
<i>by A. A. Hawley</i>	

FREE RUNNING

Editor's Notebook	6
Letters to the Editor	10
Jurisprudent Computerist	24
AI Baker's Game Corner	28
Learning with Micros	32
Micro Mathematician	34
Business Software Review	42
Mind Revolution	44
Inventor's Sketchpad	46

DEPARTMENTS

Calendar	17
Update	20
Book Reviews	22
New Products	94
Micro Market	142
Microdex	143
Advertiser Index	144

Contact authors of monthly columns by writing to them at INTERFACE AGE, P.O. Box 1234, Cerritos, CA 90701 in care of their respective columns.

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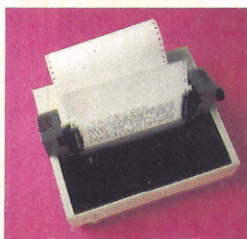


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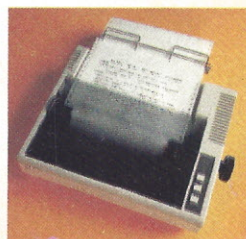
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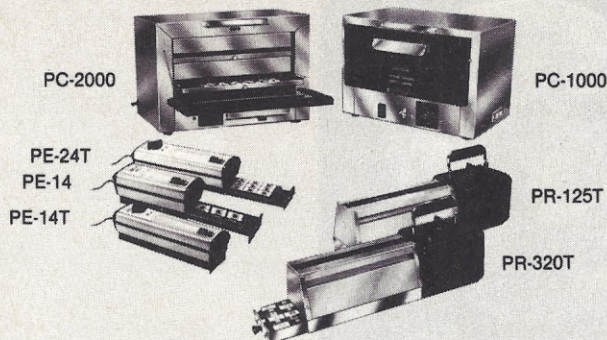


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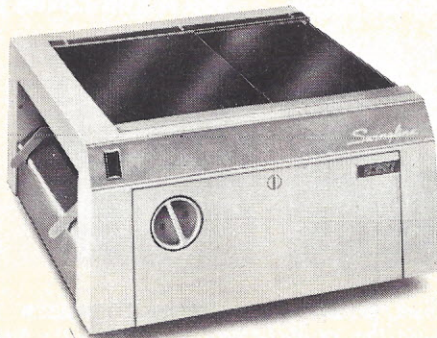
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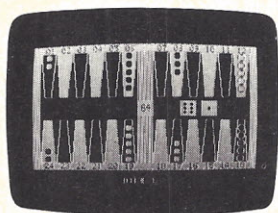
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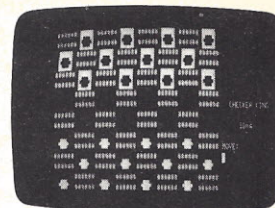
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Checker King

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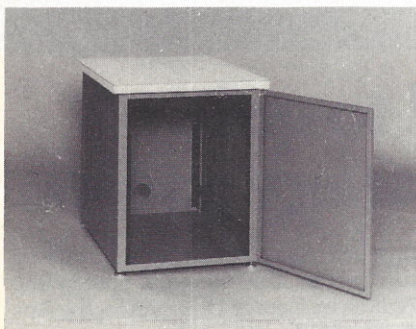
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EDITOR'S NOTEBOOK

The volume of mail that crosses our desks can sometimes be overwhelming. Upwards of 50 product announcements can land in our laps on a Monday morning. Combined with the dozens of miscellaneous press notices, appeals for money (from us?), newsletters, magazines, newspapers, invitations and the like—it doesn't take much to realize that it is impossible to report on everything in one issue.

Infinitely more material hits the roundfile than ever makes print.

But keeping the best and trashing the rest is not always easy. Sometimes an item deserves a mention that doesn't readily fit our editorial format. Such is now the case.

We received a draft of a talk by John M. Carroll, a member of the computer science department at the University of Western Ontario in London, Ontario, Canada. Carroll's paper will be presented at a major computer security and privacy symposium that we will report on next month. While browsing through his papers we were struck by a chart on the last page. Entitled "Attitudes About Ethics," it offers the answers to ten yes/no questions asked of four different groups over three years.

The groups were: senior computer science students at a midwestern university during 1977 and 1978, and computer science/data processing workers from a large midwestern bank and an east coast food chain in 1979. Replies from each group were anonymous.

We hope you will be surprised, shocked and concerned at the results.

The survey follows. Immediately below each question will be a block

A	B	C	D
---	---	---	---

The number in the A box represents the percentage of yes responses from the 1977 seniors; B from the 1978 seniors; C from the 1979 bankers and D from the 1979 grocers.

The survey

1. Do you believe it is ethical to offer use of a program you have written at your employer's expense to a friend without your employer's permission?

29	28	0	0
----	----	---	---

2. Do you believe it is ethical to do work for one employer or client using computer time supplied by another?

48	76	36	7
----	----	----	---

3. Do you believe it is ethical to use a password to a time-sharing system that you discovered accidentally by making a mistake typing in your own password?

11	22	14	7
----	----	----	---

4. Do you believe it is ethical to attempt to do, for amusement, through a computer terminal things not described in the user's manual?

59	51	36	21
----	----	----	----

5. Do you believe it is ethical to run personal programs after hours on your employer's computer?

36	38	21	14
----	----	----	----

6. Do you believe it is ethical to use a program known to you to be proprietary in such a way as to avoid being charged for its use?

27	24	57	7
----	----	----	---

7. Do you believe it is ethical to rummage through trash baskets for interesting program listings?

27	16	14	0
----	----	----	---

8. Do you believe it is ethical to request a listing of a program from the computer, discover a comment statement saying it is the property of a time-sharing service, but use the program in another computer anyway?

25	33	64	n/a
----	----	----	-----

9. Do you believe it is ethical to carry on a business as a private consultant using computer time provided by your employer?

29	43	29	14
----	----	----	----

10. Do you believe it is ethical to copy your employer's systems load modules onto magnetic tape you purchased and take them with you when you change jobs?

18	25	7	14
----	----	---	----

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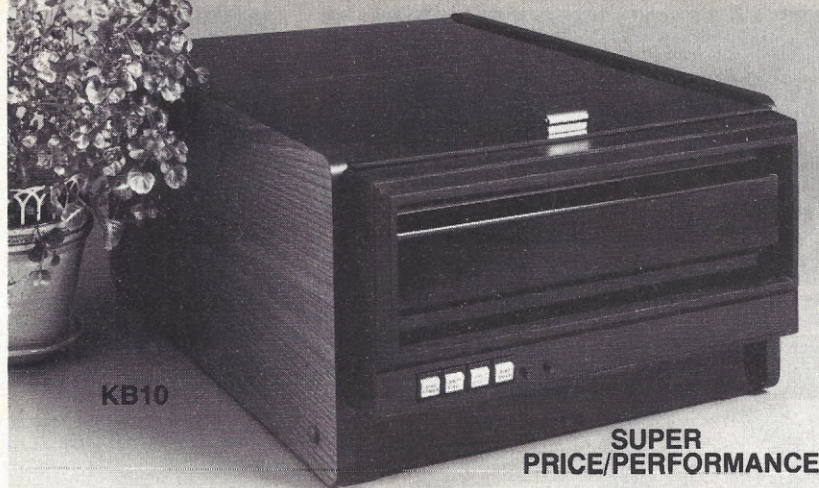
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EDITOR'S NOTEBOOK

A few comments

We don't plan to interpret the data here; and Carroll's paper says little other than to describe its mechanics.

In his conclusion, though, Carroll notes:

"Interpretation of these results would require considerable insight, perhaps more than the conditions under which they were gathered justify.

"However, even a superficial study serves to underline the need for concern, if not alarm, over the question of ethics for the computer age."

There may be a tendency to say that perhaps this has little relevance, since many of us use stand-alone micro-based systems; but we believe that anyone who really thinks that is playing a dangerous game.

The stand-alone system has tremendous, far-reaching power, and with commercial time-sharing networks such as Micronet and The Source, and access to sophisticated mainframes, the ethical problem is threatening to us.

So what can be done?

We can talk—and we encourage you to do so by writing us your thoughts on ethics for the computer age. We'll run the best of the letters in a special feedback section.

Nominations sought

The Association for Computing Machinery is seeking nominations for its Grace Murray Hopper Award, given each year to the outstanding young computer professional selected on the basis of a single recent major technical or service contribution to the computer industry. Candidates must have been 30 years of age or less at the time the qualifying contribution was made.

While the award is given to a young computer professional, emphasis will be placed on outstanding contributions in the fields of data processing and/or personal computing. The committee feels that these areas have not been adequately rewarded for contributions in the past.

The award, in the amount of \$1,000, will be presented at the opening of the Association's annual conference on October 27 in Nashville.

Nominations, which may be made by the nominees themselves, should be sent no later than June 30, 1980, to: Elliot I. Organick, Dept. of Computer Science, University of Utah, Salt Lake City, UT 84112.

Please include the following information:

- Name, address and phone number of the person making the nomination.
- Name, address, and phone number of the nominee.
- A statement (200-500 words) on why the candidate deserves the award, describing the contribution.
- The date of birth of the nominee and the date on which the qualifying work was completed. □

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And the whole host of CP/M-based business, scientific and educational applications can be easily transferred to your Apple with SoftCard.

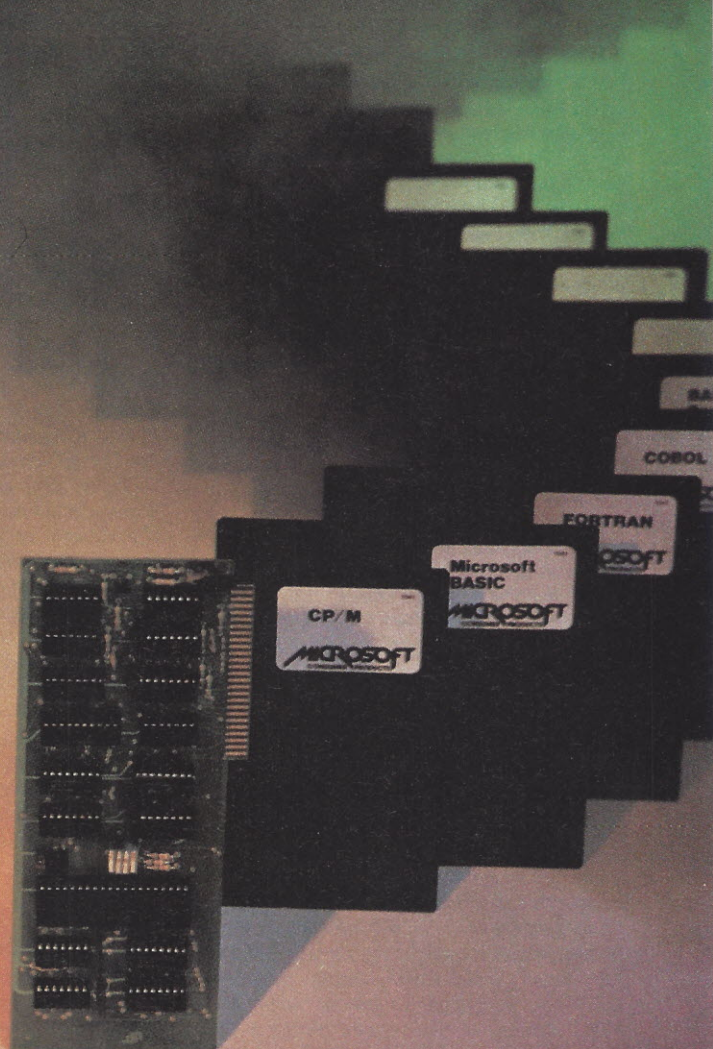
The Microsoft Z-80 SoftCard is compatible with most every Apple product from the Apple II to the Apple II Plus, Language Card and peripherals. Independent peripherals for the Apple are supported as well. The SoftCard package requires a system with 48K and a disk drive.

Line up a SoftCard demonstration at your Microsoft Consumer Products dealer today. They'll be glad to show you how the Z-80 SoftCard and your Apple computer combine to form a system that can't be beat for either practicality or pure pleasure by any personal computer available today. Or give us a call, 206/454-1315, for more information.

But act quickly. At the low price of \$349 for SoftCard, CP/M, Microsoft BASIC and complete documentation, you may have to stand in line to get one!

™ Apple II is a trademark of Apple Computer, Inc.

* CP/M is a registered trademark of Digital Research.



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Apple-ications

In Chapter 9 of the "Pascal Notebook," I think you omitted in your references a recent book by I.R. Wilson and A.M. Addyman, *A Practical Introduction to Pascal*, Springer-Verlag, New York, 1979.

I am quite disappointed in the Apple Pascal implementation because the precision of real variables is limited to six places—totally inadequate for scientific calculations. I have pointed this out to the Apple people but have no satisfactory answer other than to use long integers. Integers are simply not useful for handling scientific data or, at least, I don't know how to use them effectively. Have you any suggestions to extend the Apple Pascal to a full 64-bit double precision for real variables? Has anyone written a Fortran compiler for the Apple?

Sutton Redfern
Lacey, WA

Pascal does not include double precision reals as a standard type. A language can't be all things to all people. However, the majority of programs written using floating point numbers never need more than single precision. On the IBM 360/370 this means 32 bits—exactly the same as Apple's Pascal. There are certainly cases where double or quad precision is necessary. These are generally the exception since most real world data is limited to three or four significant digits. You may want to reexamine your data in light of significant digits.

One way around single precision arithmetic is to write your own Procedures/Functions to implement 64-bit floating point arithmetic. . . it will be slower than built-in multiple precision but will get the job done. Incidentally, Apple supports assembly language interfaces with the UNIT option so you could produce the routines in assembly language for speed. Note that you will have to define a new data type explicitly in your programs that use double precision.

Regarding Fortran for the Apple, expect an announcement soon.

—Ed.

Anthropomorphism: A 4-Letter Word?

Anthropomorphism is the curse of man. I was involved in the early computer era, employed on one of the first commercial mainframes. In those days, one could follow the process of binary arithmetic through discrete logic devices, hardwired arithmetic processors and registers—bit by bit—with an oscilloscope. It was necessary to think in binary and one dealt with the machine with the intimate knowledge of a surgeon picking his way through corporal complexities.

About that time, a group of brilliant minds was at work, in the field of computer control. Norbert Weiner coined the term "cybernetics," which was defined as "control and communication in man and machine." The work of this group was fascinating, but its direction was towards proving similarity, rather than parallelism. Computers became known as "electronic brains"; "storage" became "memory" and machines began to "learn," as man attempted to create a superbeing.

This brings me to Roger Garrett's discussion of artificial intelligence. My strong opinion is that machines have no intelligence, do not make decisions, cannot learn and most certainly do not think.

John E. Heselton
British Columbia, Canada

In Praise of Fortran Fundamentals

Thank you for your excellent articles on Fortran fundamentals (Mar. & Apr.). I bought the TRS-80 Fortran disks and manual, and a textbook. This was "Fortran with Engineering Applications" by Daniel D. McCracken. My equipment is TRS-80, 48K, 2 disks, printer and modem. The situation was pretty bad as the textbook is data-card based and the Shack manual is no help in getting started. However, when your articles came along, I was able to start, as your instructions are based on a system like mine.

I am one of the many thousands whose first hands-on experience with computer systems is on their own equipment at home. How much we appreciate the kindness, patience and just plain hard work that goes into tutorials such as David Marca's. Thanks again.

Richard Halloran
San Francisco

Defending Micros

I feel you should have charged Stephen A. Kallis, Jr. for printing his article "Alternative to Microcomputer Construction." It is a blatant advertisement for Digital Equipment Corp.'s over-priced hardware and software.

Admittedly, trying to transform a TRS-80, an Apple, an Atari, or a Cridy into a full business system is difficult. However, the small business would only have one or two functions automated. When it does need to expand data processing, it can buy an S-100 microprocessor system and Microsoft BASIC, using the original system for word processing and the new system for the rest of its data processing. This would still cost less than a DEC system.

Mr. Kallis also chose to ignore the many S-100 and SS-50 systems that can perform tremendous amounts of data processing. Maybe he hasn't heard of North Star, Cromemco, Alpha Micro, Vector, Ithaca Inter-system, Delta Products and others. Surely he has missed CP/M 2.0, MPM, Oasis, Tempos, Multi User BASIC; several versions of Cobol, Fortran and Pascal; and Unix Version 7 on a Z-8000. He is hiding

from the fact that the 8085, Z-80, 6809, 6502, 8086, 8088, Z-8000 and 68000 successfully compete with the low end of the minicomputer market.

The most serious error is not recognizing the wide range of needs for information processing in the business world. If a \$2,000 computer fills that need, why buy a \$15,000 system? Let Mr. Kallis compare the software base of the TRS-80 alone with the DEC on the basis of price and satisfying a specific need—he will be surprised. I am disappointed in Interface Age for printing this grossly misleading article.

Thomas McCulley
Houston, TX

Bug Catcher

The indexed sequential access method program (Nov. 1979) contained a typographical error, which created problems in the "Erase" sequence and it took quite awhile for me to pin down the actual problem. I am happy to report I was able to uncover the bug. The specific program line is number 18320. As published, the line reads "go to 18430." The erase sequence works properly when this program line is changed to "go to 18340." I have learned a great deal from working with the program and look forward to seeing other articles by R. F. Zant.

Thomas W. Edwards
Minneapolis, MN

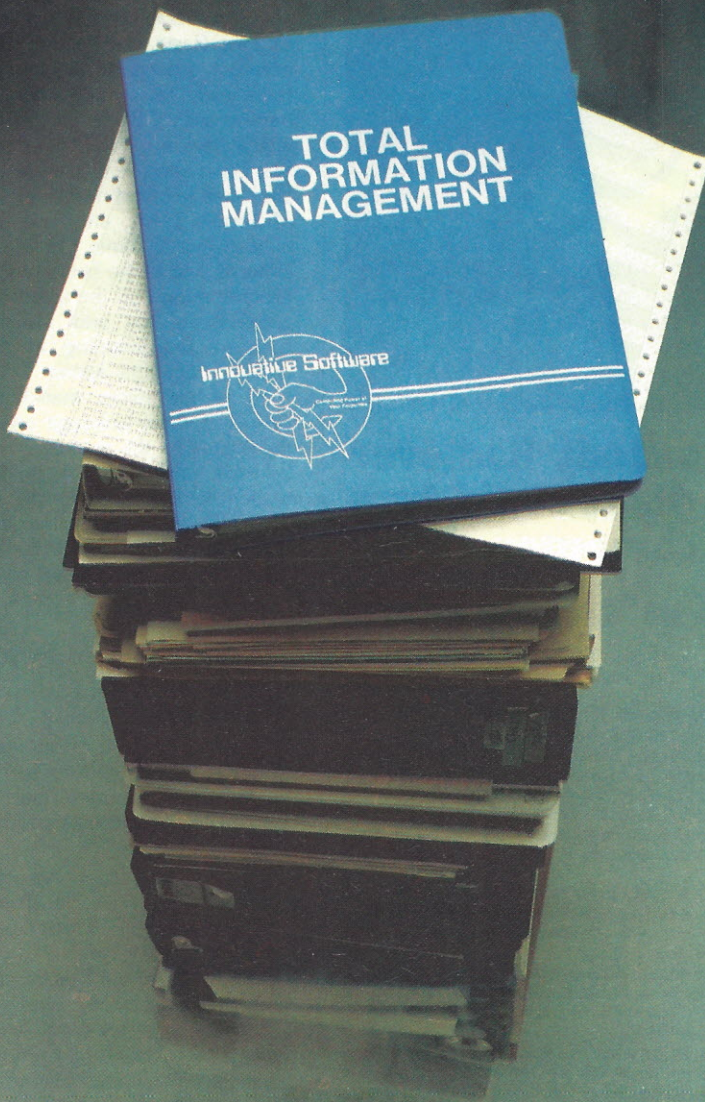
Ledgerplus Plus...

Thanks for your review of Ledgerplus (Feb.). For the record, I would like to point out some minor errors and omissions. The software is not confined to the Vector Graphic MZ computer; it is available for the Vector MZ, Memotite and System B computers, S-100 mainframes with Micropolis quad-density disk drive subsystems, and all versions of the Apple II computer (48K RAM and 2 floppy disk drives).

General ledger has several accounting controls that you inadvertently overlooked. I have indicated in parentheses the page numbers of the GL operations manual that discuss these. All printed reports generate the error messages that warn when the accounts are out of balance (pages 4-7). All changes to the chart of accounts and balances automatically generate a forced print-out of the audit trail via the transaction entry journal (pages 3-7). It is not possible to omit or duplicate an account balance in the financial statements without generating printed error messages that specify the missing or duplicate accounts and corresponding headers (pages 3-55). On the Vector system, a set of sample headers are available (pages 3-39).

Darshan Singh Khalsa
MicroSource
Tempe, AZ

YOU'VE LOOKED AT THE REST NOW LOOK AT THE BEST!



INTRODUCING T.I.M.

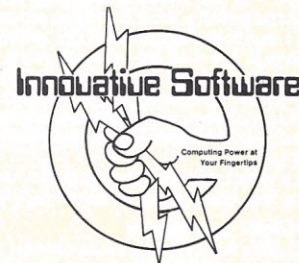
You've decided that a computer might help you perform certain functions in your business more efficiently. Now you are looking at different machines and software. Here's where your problem starts.

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**Trademark of Microsoft

LETTERS

From 8 to 5

I am currently working on a project on floppy disks, concentrating on the advantages and disadvantages between the 8-inch and 5¼-inch floppy disks in a business microcomputer system. I would appreciate any information that you or your readers may supply.

P. Jakins

28 Huntingdon St., East Vic Park, 6101
Western Australia

Heed Your Manufacturer

For anyone thinking about hanging a dot matrix line printer onto a microcomputer

system, pay close attention to the manufacturer's recommendations.

North Star recommends the Anadex DP-8000 connected to the parallel interface of their Horizon. I chose to save a few bucks by building a Heath H14 line printer for the serial interface. The H14 flunked its initial power-on tests. A local repair center replaced two defective CMOS ICs and repaired three open foil breaks in the 5V supply on the PC board at no charge, but they detected erroneous installation of seven transistors.

My WH14 printer tested perfectly at 4800 baud under HDOS at the repair center. It

went ape at 4800 baud on the Horizon after I got it home. A quick phone call to my Horizon dealer divulged the fact that North Star doesn't test for handshaking signals. (The Heath manual advises to run no faster than 110 baud without handshaking.)

Now I have a 110 baud line printer dawdling along while the 4MHz Z-80A and I are twiddling our respective thumbs. Does anybody want to trade an in-warranty Anadex DP-8000 printer for an in-warranty Heath WH14 plus some extra cash?

John R. Dye
4807 Fifteenth Ave. S.E.
Lacey, WA 98503

*A trademark of the Tandy Corporation



A year ago, when nobody had ever heard of me, I said these disks could turn a TRS-80* into a serious computer.

Now they tell me I'm "the standard of the industry."

I'm Irwin Taranto, and times have changed.

In the first twelve months, almost a thousand businesses put me to the test.

You can buy my TRS-80 systems all over the country—dozens of companies sell them. Some are my dealers, some aren't. And this creates a new set of problems.

You see, learning to use a computer—any computer—is like learning anything else. It takes some getting used to. If you sit down with a computer program and the manual and try to figure it out all by yourself, you'll probably just give up and feel you've been had.

You have to hang in there for a month, make a few phone calls, and have somebody who really understands the system help you work it out.

That's why I still answer the phone. And why, I guess, people say all those nice things.

The Model I systems

So far, I have six systems for the Model I, at \$99.95 each, plus \$20 each for the books where required. For the Cash Journal option on the General Ledger, add another \$50.

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For the Model I programs, you can tell us what you need in a letter or by phone. You get the disk and all the instructions you need. Any problems, just call me.

For the Model II programs, I ask you to fill out a questionnaire before I send you any materials. The systems have so much flexibility we tailor them to your needs.

That way, I make sure you get a system that works. If you have any doubts about that, I'll give you the names of some people in your area who've already been through the process.

Let them tell you whether I really deserve that fancy new reputation.

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'Basic' Disagreement

Regarding Alan Miller's review of Microsoft Basic (IA, April, 1980), it was a waste to compare this to more primitive Basics such as Tiny Basic, and to dwell on the more primitive aspects of the interpreter. A far more useful review might have been a comparison with CBasic or Micropolis Basic, which have a full set of features; or North Star Basic because of its wide use. Microsoft Basic has all of the extensions of CBasic and Micropolis Basic, and runs from three to almost twenty times faster. A Microsoft editor is one of the best available for Basic programming and the extensive formatting capability of the print statements makes business programming a relatively easy task. My opinions appear to be shared by most of the micro manufacturers, since Microsoft is the language used by 90% of the micros on the market.

I think Interface Age might do a service to readers by running a definitive critique of the various Basics available, including Microsoft Basic, comparing them to some of the newer languages such as the various micro-Pascals, Cobols and Fortrans.

John Corbani
Santa Barbara, CA

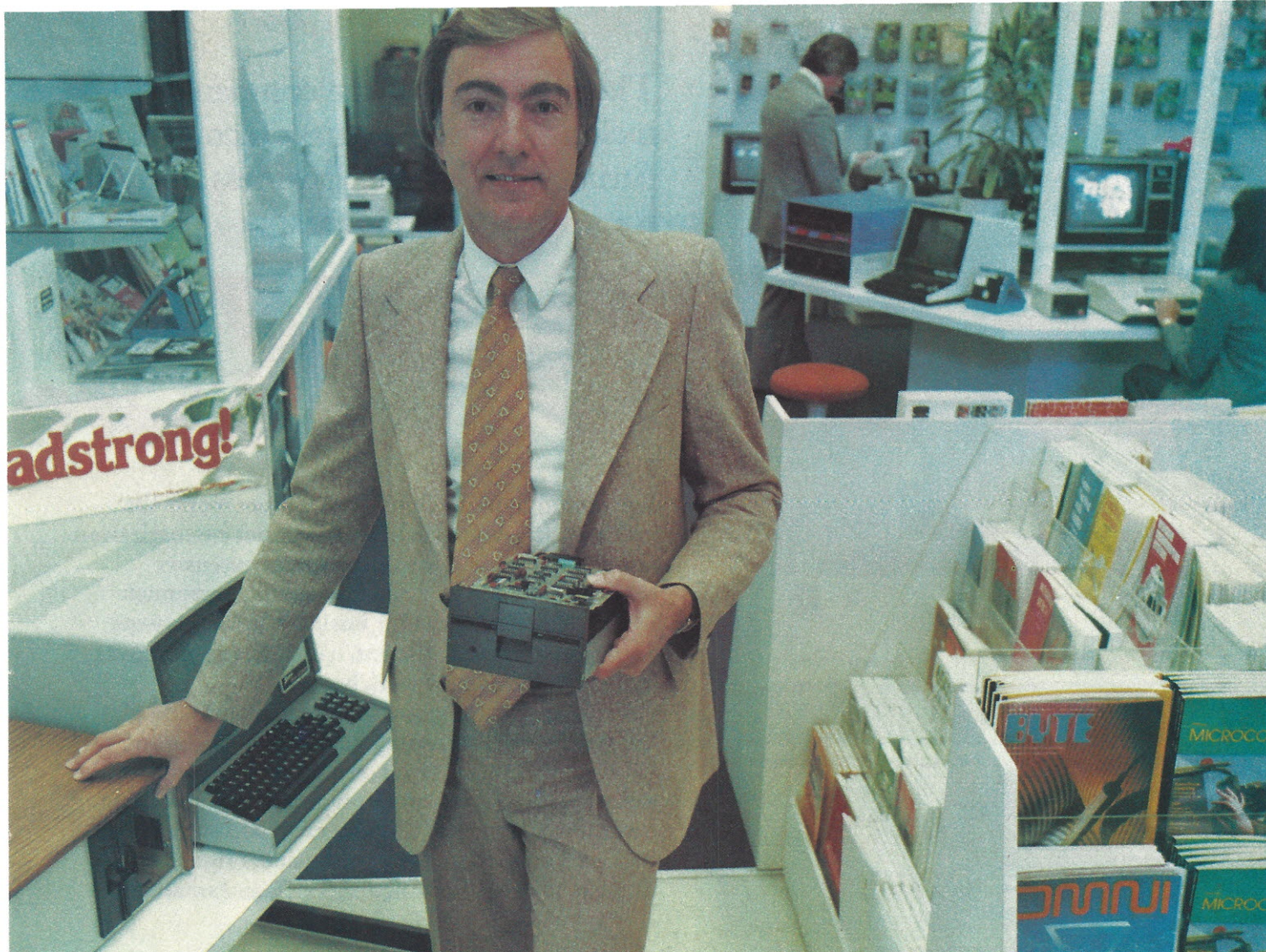
Apple for the Teacher

I use an Apple II in my instructional efforts. Our department prepares all manner of vocational education teachers. I would appreciate information concerning applications or programs.

Jack Huck, Associate Professor
So. Illinois University
Carbondale, IL 62901

The Apple for the Teacher is a group emphasizing educational uses of the Apple computer. The newsletter features reviews of educational software. Current information is presented on educational computer grants and educational computer research. The group is operating the national computer assisted instruction library for the Apple computer. For more information write:

Ted Perry
Apple for the Teacher
5848 Riddio St.
Citrus Hts., CA 95610



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have been installed. The Minifloppy looks small—but it stores a lot of data. 250 kilobytes on one side, or up to 500 kilobytes in the double-sided model. That’s about 50 pages of printed information on a single-sided Minidiskette, and twice that on the double-sided version. You’ll have plenty of storage capacity for your programs, letters, forms, or ledger entries. And you find your data fast, too, because the Minifloppy is a random access device

that eliminates the need to search for your data serially as you must with a tape cassette unit.

No matter what problem you’re solving with your computer system, you can rely on Shugart’s Minifloppy for data storage. We’re known as the Headstrong company for good reason. We’re Headstrong about reliability, quality, and value. Ask your dealer. He knows us.

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*SSG business software runs on these and many other microcomputer systems. See your computer dealer for compatible hardware, or send for our brochure, Choosing A Computer For Your Business: SSG Software and Compatible Hardware.

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Free Literature

Data sheets—Featured on two pages are three thumbwheel switches, the 43000 Miniswitch and the 44000/45000 Slimswitches. Each one contains full specifications and engineering drawings. The Digitran Co., 855 S. Arroyo Parkway, Pasadena, CA 91105, (213) 449-3110.

Application brochure—A seven-page guide, "The SNP-1000 Statistical Network Processor Buyer's Guide," applies a network multiplexing processor that permits multiple computer terminals to share a single telephone line. Prentice Corp., 266 Caspian Dr., Sunnyvale, CA 94086, (408) 734-9810.

Overview of modems—A 12-page brochure highlights Codex' modem line, including the LSI series, the micro-processor-based MX series, the low speed 5000 series and the short-haul and group band modems. Codex Corp., 20 Cabot Blvd., Mansfield, MA 02048, (617) 364-2000.

Discounted supplies—Data recording products, stock forms, ribbons and computer room furniture are some of the items featured in Computer Supplies Catalog. Executive Computer Supplies, Suite 114, 1437 Belcher Rd. S., Clearwater, FL 33516, (813) 536-1277.

Product summary—A four-page brochure features nine quad size data storage interface products for control of disk/tape drives with DEC-11 CPUs. Distributed Logic Corp., 12800-G Garden Grove Blvd., Garden Grove, CA 92643, (714) 534-8950.

Product presentation—Oscilloscopes, function and video generators are among products offered in a 40-page full line catalog. Featured are specifications and applications of more than 50 test instruments. Leader Instruments Corp., 380 Oser Ave., Hauppauge, L.I., NY 11787, (516) 231-6900.

Updated catalog—The 1980 edition of a short form booklet features current and future products, including electrical characteristics and replacement devices. Products featured are data acquisition and conversion devices, CMOS static RAMs and dual transistors. Micro Power Systems, Inc., 3100 Alfred St., Santa Clara, CA 95050, (408) 246-5350.

Selection of cables—A 36-page catalog features interconnecting cables and connectors for computer applications. Also offered is bulk cable, UL listed shielded and unshielded multiconductor and coaxial cable, plus AMP connectors and components. Craig Data Cable Co., Inc., 154 Post Rd. E., Westport, CT 06880, (203) 356-9315.

Computer graphics—An eight-page booklet, "Raster Scan, the Display Technology of the 80's," describes four basic computer graphics display technologies. It details the differences between storage tube, stroke writer, plasma and raster scan. Ramtek Corp., 2211 Lawson Ln., Santa Clara, CA 95050, (408) 988-2211.

VE series connector catalog—A 12-page booklet offers connectors for heavy duty transportation made of a metal outer shell, a monobloc insulator and a high volume crimp contact. Charts on performance characteristics and alternate insertion positions are also included. ITT Cannon Electric, 666 E. Dyer Rd., Santa Ana, CA 92702, (714) 557-4700.

The Working Analyst.



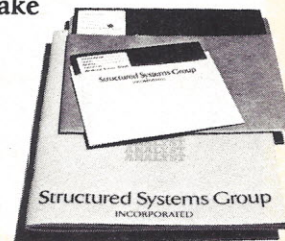
If you would like to put a computer to work collecting, organizing, and summarizing the information you need to make better decisions, take a look at Analyst.

Analyst is a software package designed to let you store and analyze virtually any information involving numbers, dollars, dates, and descriptions. Simply tell Analyst what kind of information

you want to store. Analyst creates a computerized file for that information. And Analyst creates an information entry program for your file that asks you for each entry, and checks your data for errors. (You can create any number of different files.)

Then tell Analyst what reports you want from your data file. There are all sorts of record selection and report formatting options, so you can design an unlimited variety of reports to focus on different aspects of the same data file.

Analyst is so flexible, you'll find a million ways to use it. It is easy to use, so you don't need to be a programmer to make your computer really work for you. If this bit of information intrigues you, find out the rest. You'll like what you see.



Analyst is a part of a full line of working software solutions from Structured Systems Group, all ready to run on any CP/M* microcomputer system. For more information, see your computer retailer, or call us.

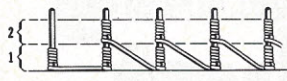
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CALENDAR

Jul 1, IEEE Indy Microcomputer Show, Sheraton Motor Inn East, Indianapolis, IN, exhibits, demonstrations, technical seminars on engineering, industrial, scientific, medical, business and personal applications. Contact: Harry D. Bostic, Naval Avionics Center, 6000 E. 21st St., Indianapolis, IN 46218, (313) 353-3047.

Jul 11-12, London Computer Fair, Polytechnic of North London Theatre, seminars on computers and education, workshops, bazaar of used equipment and software. Contact: Robin Bradbeer, North London Hobby Computer Club, Holloway, London N7 8DB, 01-607 2789.

Jul 14-16, Diagnostic Software: Planning and Design Seminar, Sheraton-Lexington Motor Inn, Lexington, MA, design examples, lectures, informal sessions with instructors and group diagnostic programming sessions. Contact: Prof. Donald French, Institute for Advanced Professional Studies, One Gateway Center, Newton, MA 02158, (617) 964-1412.

Jul 17-19, Workshop on Motorola 6801 Single Chip Microcomputer Design, Interfacing and Applications, Virginia Tech Facility, Dulles Airport, Blacksburg, VA. Contact: Dr. Linda Leffel, CEC Virginia Tech, Blacksburg, VA 24061, (703) 961-5241.

Jul 22-24, Microcomputer Show and International Conference, Wembley Conference Centre, London, England, industrial applications, micro-based commercial systems, micros in DP and advanced micro system design. Contact: TMAC, 680 Beach St., Suite 428, San Francisco, CA 94109, (800) 227-3477.

Jul 25-27, Videospace Consumer Show, Seattle Center, North Court, workshops, guest speakers, computers, special exhibitions and displays of video hardware, security systems and personal computers. Contact: Michael Gaines, Rising Starr Productions, P.O. Box 17209, Seattle, WA 98107, (206) 682-7724.

Jul 28-Aug 1, Harvard Computer Graphics Week, Hyatt Regency Hotel, Cambridge, MA, discussions and examples of applications of business graphics and computer mapping in commercial, educational and governmental sectors, also displays of recent developments in graphic hardware. Contact: Kathy Devaney, Center for Management Research, 850 Boylston St., Chestnut Hill, MA 02167.

Aug 21-24, Personal Computing and Small Business Computer Show, Philadelphia Civic Center, exhibits and seminars highlighting all aspects of personal and small business computing. Contact: John Dilks, Personal Computing '80, Route 1, Box 242, Ward Rd., Mays Landing, NJ 08330, (609) 653-1188.

Sep 3-5, Electronic Business Communications Conference and Exhibition, Las Vegas Convention Center, defines emergence of a synergism among telecommunications, data processing, office machines, differing transmission modes and carriers. Contact: John Sodolski, Electronic Industries Assoc., 2001 Eye St., N.W., Washington, D.C. 20006, (202) 457-4934.

Sep 11-13, Internecon/Semiconductor International Conference and Exposition, PSA World Trade Centre, Republic of Singapore, production machinery, tools, hardware, materials and test instruments keyed to needs of engineering, manufacturing and support personnel of Southeast Asia. Contact: Industrial and Scientific Conference Management, Inc., 222 W. Adams St., Chicago, IL 60606, (312) 263-4866.

Sep 16-18, Wescon/80, Anaheim Convention Center, Anaheim, CA, high-technology electronics convention and exhibition with approximately 1200 booths. Contact: Robert Myers, 999 North Sepulveda Blvd., El Segundo, CA 90245, (213) 475-4571.

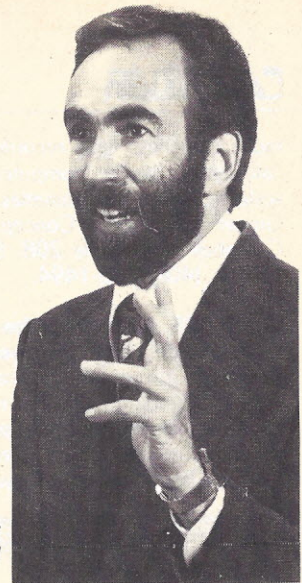
Sep 19-21, The Decade of Opportunity Home Electronics Show, Brooks Hall, San Francisco, CA, hands-on demos of home electronic products, VTRs, TV games, TV's, electronic games,

FTC Revolt

You've heard of the tax revolt. It's about time for an FTC revolt. Here's my story and why we've got to stop federal bureaucratic regulation.

By Joseph Sugarman,
President, JS&A Group, Inc.

My story is only one example of how the FTC is harassing small businesses but I'm not going to sit back and take it.



I'm pretty lucky. When I started my business in my basement eight years ago, I had little more than an idea and a product.

The product was the pocket calculator. The idea was to sell it through advertisements in national magazines and newspapers.

Those first years in the basement weren't easy. But, we worked hard and through imaginative advertising and a dedicated staff, JS&A grew rapidly to become well recognized as an innovator in electronics and marketing.

THREE BLIZZARDS

In January of 1979, three major blizzards struck the Chicago area. The heaviest snowfall hit Northbrook, our village—just 20 miles north of Chicago.

Many of our employees were stranded—unable to get to our office where huge drifts made travel impossible. Not only were we unable to reach our office, but our computer totally broke down leaving us in even deeper trouble.

But we fought back. Our staff worked around the clock and on weekends. First, we processed orders manually. We also hired a group of computer specialists, rented outside computer time, employed a computer service bureau, and hired temporary help to feed this new computer network. We never gave up. Our totally dedicated staff and the patience of many of our customers helped us through the worst few months in our history. Although there were many customers who had to wait over 30 days for their parcels, every package was eventually shipped.

WE OPENED OUR DOORS

During this period, some of our customers called the FTC (Federal Trade Commission) to complain. We couldn't blame them. Despite our efforts to manually notify our customers of our delays, our computer was not functioning making the task extremely difficult.

The FTC advised JS&A of these complaints. To assure the FTC that we were a responsible company, we invited them to visit us. During their visit we showed them our computerized microfilm system which we use to back up every transaction. We showed them our new dual computer system (our main system and a backup system in case our main system ever failed again). And, we demonstrated how we were able to locate and trace every order. We were very cooperative, allowing them to look at every document they requested.

The FTC left. About one week later, they

called and told us that they wanted us to pay a \$100,000 penalty for not shipping our products within their 30-day rule. (The FTC rule states that anyone paying by check is entitled to have their purchase shipped within 30 days or they must be notified and given the option to cancel.)

NOT BY CONGRESS

The FTC rule is not a law nor a statute passed by Congress, but rather a rule created by the FTC to strengthen their enforcement powers. I always felt that the rule was intended to be used against companies that purposely took advantage of the consumer. Instead, it appears that the real violators, who often are too difficult to prosecute, get away while JS&A, a visible and highly respected company that pays taxes and has contributed to our free enterprise system, is singled out. I don't think that was the intent of the rule.

And when the FTC goes to court, they have the full resources of the US Government. Small, legitimate businesses haven't got a chance.

We're not perfect. We do make mistakes. But if we do make a mistake, we admit it, accept the responsibility, and then take whatever measures necessary to correct it. That's how we've built our reputation.

BLOW YOUR KNEE CAPS OFF

Our attorneys advised us to settle. As one attorney said, "It's like a bully pulling out a gun and saying, 'If you don't give me a nickel, I'll blow your knee caps off.'" They advised us that the government will subpoena thousands of documents to harass us and cause us great inconvenience. They warned us that even if we went to court and won, we would end up spending more in legal fees than if we settled.

To settle would mean to negotiate a fine and sign a consent decree. The FTC would then issue a press release publicizing their victory.

At first we tried to settle. We met with two young FTC attorneys and agreed in principle to pay consumers for any damages caused them. But there were practically no damages, just a temporary computer problem, some late shipments, and some bad weather. The FTC then issued a massive subpoena requesting documents that will take us months to gather and which we feel was designed to harass or force us to accept their original \$100,000 settlement request.

Remember, the FTC publicizes their actions. And the higher the fine, the more the

publicity and the more stature these two attorneys will have at the FTC.

If this all sounds like blackmail—that's just what it appeared to be to us.

We did ship our products late—something we've admitted to them and which we publicly admit here, but we refuse to be blackmailed into paying a huge fine at the expense of our company's reputation—something we've worked hard eight years to build.

We're not a big company and we realize it would be easier to settle now at any cost. But we're not. If this advertisement can attract the attention of Congressmen and Senators who have the power to stop the harassment of Americans by the FTC, then our efforts will be well spent.

ALL AMERICANS AFFECTED

Federal regulation and the whims of a few career-building bureaucrats is costing taxpayers millions, destroying our free enterprise system, affecting our productivity as a nation and as a result is lowering everybody's standard of living.

I urge Congressmen, Senators, businessmen and above all, the consumer to support legislation to take the powers of the FTC from the hands of a few unelected officials and bring them back to Congress and the people.

I will be running this advertisement in hundreds of magazines and newspapers during the coming months. I'm not asking for contributions to support my effort as this is my battle, but I do urge you to send this advertisement to your Congressmen and Senators. That's how you can help.

America was built on the free enterprise system. Today, the FTC is undermining this system. Freedom is not something that can be taken for granted and you often must fight for what you believe. I'm prepared to lead that fight. Please help me.

Note: To find out the complete story and for a guide on what action you can take, write me personally for my free booklet, "Blow your knee caps off."

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THAT THINK

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CALENDAR

radio, cassettes, tape recorders, speakers, calculators, home computers, telephone systems, CBs, video cassettes, etc. Contact: Ginger Taylor, J & J Concepts, Inc., 5120 Campbell Ave., Suite 208, San Jose, CA 95130, (408) 866-1494.

Sep 22-25, National Software Package Conference and Exposition, Hyatt Regency, Chicago, IL, applications and systems of computer software, recent innovations in systems houses, data processing, telecommunications and word processing. Contact: Kim Moloney, Software Info, Professional Exposition Management Co., Suite 545, 222 W. Adams St., Chicago, IL 60606, (312) 263-3131.

Sep 25-26, Ada Introduction and Trends Seminar, Sheraton Motor Inn, Lexington, MA, application examples, lectures, informal sessions, coverage of the latest developments in the Ada language, rationale for its design and implications for industry. Contact: Prof. Donald French, Institute for Advanced Professional Studies, One Gateway Center, Newton, MA 02158, (617) 964-1412.

Sep 25-26, Ada Introduction and Trends Seminar, Sheraton Motor Inn, Lexington, MA, application examples, lectures, informal sessions, coverage of the latest developments in the Ada language, rationale for its design and implications for industry. Contact: Prof. Donald French, Institute for Advanced Professional Studies, One Gateway Center, Newton, MA 02158, (617) 964-1412.

Sep 26-27, Classroom Applications of Computers in Grades K-12 Conference, Independence High School, San Jose, CA, tutorial sessions, workshops and

industrial exhibits of hardware and software. Contact: W. Don McKell, Computer-Using Educators, Independence High School, 1776 Educational Park Dr., San Jose, CA 95133.

Sep 27-28, Personal Computer Show and Fleamarket, Holiday Inn (North), Newark, NJ, computers, accessories, software, books and parts for hobbyists and businessmen. Contact: Kengore Corp., 9 James Ave., Kendall Park, NJ 08824, (201) 297-6918.

Oct 7-10, International Congress for Data Processing and Software Exchange, International Congress Centre Berlin, trends in data processing, development and problems of modern hardware; innovative applications systems, computers and industry and educational tasks in computer age. Contact: AMK Berlin, Messedamm 22, D-1000 Berlin 19, West Germany, (030) 30 38-1.

Oct 8-22, Electronics Tour, Korean, Japan, Taiwan and Hong Kong Electronics Shows, develop foreign markets, observe foreign technology and innovations, seek foreign capital and investment, develop new products and improve personal contacts with foreign counterparts. Contact: Com-

merce Tours Int'l, Inc., 870 Market St., Suite 762, San Francisco, CA 94102, (415) 433-3072.

Oct 14-16, Mini/Micro Conference and Exposition, Civic Auditorium, Brooks Hall, San Francisco, CA, technical program and product expo devoted to small computers. Contact: Mini/Micro Computer Expo, 32302 Camino Capistrano, Suite 202, San Juan Capistrano, CA 92675.

Oct 30-Nov 1, National Small Computer Show, New York Coliseum, hardware displays of minis, micros, peripherals and many other services, software for business and industrial systems. Contact: National Small Computer Show, 110 Charlotte Pl., Englewood Cliffs, NJ 07632.

Nov 18-20, Information Management Expo and Conference, McCormick Place, Chicago, sessions and exhibits covering information systems for material resource planning, capacity planning, shop floor control, warehousing, materials handling, inventory control, maintenance, closed loop systems, production planning, master schedule preparation, office automation, etc. Contact: Clapp and Poliak, Inc., 245 Park Ave., New York, NY 10017.

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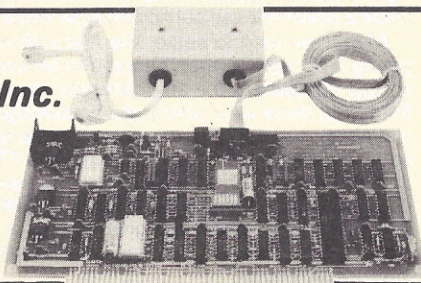
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SuperSoft announces a complete line of CP/M* compatible software

ACCOUNTING

SuperSoft offers a complete, interactive accounting system at an affordable price. We started with the Osborne accounting system, the standard of the industry, and made it even better. Since either the General Ledger and the Accounts Payable/Receivable can stand alone, you do not need to purchase the entire system at once. This means that you can start with what you need and up-grade later. Look for a compatible Payroll package in the future.

ACCOUNTS PAYABLE/RECEIVABLE: A complete, user oriented package which features:

- automatic postings to general ledger (optional)
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- accounts receivable: • progress billing • customer statements
- partial invoice payments • invoice aging

The entire package is menu driven and easy to learn and use. It incorporates error checking and excellent user displays. This package can be used stand alone or with the General Ledger below. Requires: 48K CP/M, terminal with cursor positioning and clear screen, one 8" disk or two 5 1/4" disks. CBASIC2 required.

Supplied with extensive user manual: \$200.00. Manual alone: \$20.00.

GENERAL LEDGER: A complete, user oriented package which features:

- Accepts postings from external programs (i.e. AP/AR above)
 - Accepts directly entered postings
 - Maintains account balances for current month, quarter, and year and previous three quarters
 - Financial reports: trial balance, income statement balance sheet, and more.
- Completely menu driven and easy to learn and use. Excellent displays and error checking for trouble free operation. Can be used stand alone or with Accounts Payable/Receivable above. Minimal requirements: 48K CP/M, terminal with cursor positioning, home and clear screen, one 8" disk or two 5 1/4" disks. CBASIC2 required.

Supplied with extensive user manual: \$200.00. Manual alone: \$20.00.

TEXT PROCESSING

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- left & right margin justification
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- dynamic insertion from disk file
- extended & indented paragraphs
- works with any printer or CRT
- tabbing
- auto paragraphing
- auto list numbering
- centering
- user defined macros
- underlining and backspace
- much, much more

TFS lets you make multiple copies of any text. For example: Personalized form letters complete with name & address & other insertions from a disk file. Text is not limited to the size of RAM making TFS perfect for reports, manuals or any big job.

Text is entered using CP/M standard editor or most any CP/M compatible editor. TFS will link completely with Super-M-List making personalized form letters easy.

Requires: 24K CP/M.

Supplied with extensive user manual: \$85.00. Manual alone: \$20.00.

Source to TFS in 8080 assembler (can be assembled using standard CP/M assembler) plus user manual: \$250.00.

MAILING LIST

SUPER-M-LIST: A complete, easy to use mailing list program package. Allows for two names, two address, city, state, zip and a three digit code field for added flexibility. Super-M-List can sort on any field and produce mailing labels direct to printer or disk file for later printing or use by other programs. Super-M-List is the perfect companion to TFS. Handles 1981 Zip Codes!

Requires: 24K CP/M.

Supplied with complete user manual: \$75.00. Manual alone: \$10.00.

UTILITIES

Utility pack #1: A collection of programs that you will find useful and maybe even necessary in your daily work (we did!). Includes:

- CMP:** Compare two files for equality.
- ARCHIVER:** Compacts many files into one, useful when you run out of directory entries.
- SORT:** In core sort of variable length records.
- XDIR:** Extended, alphabetical directory listing with groupings by common extension.
- PRINT:** Formatted listings to printer.
- PG:** Lists files to CRT a page at a time.
- ... plus more ...

Requires: 24K CP/M.

Supplied with instructions on discette: \$50.00.

SYSTEM MAINTENANCE

DIAGNOSTICS I: Easily the most comprehensive set of CP/M compatible system check-out programs ever assembled. Finds hardware errors in your system, confirms suspicions, or just gives your system a clean bill of health. Tests:

- Memory
- CPU (8080/8085/Z80)
- Terminal
- Disk
- Printer

To our knowledge the CPU test is the first of its kind anywhere. Diagnostics I can help you find problems before they become serious. A good set of diagnostic routines are a must in any program library.

Minimal requirements: 24K CP/M. Supplied with complete user manual: \$50.00. Manual alone: \$15.00.

SOFTWARE SECURITY

ENCODE/DECODE: A complete software security system for CP/M. Encode/Decode is a sophisticated coding program package which transforms data stored on disk into coded text which is completely unrecognizable. Encode/Decode supports multiple security levels and passwords. A user defined combination (One billion possible) is used to code and decode a file. Uses are unlimited. Below are a few examples:

- data bases
- general ledger
- inventory
- payroll files
- correspondence
- accounts pay/rec
- programs
- tax records
- mailing lists

Encode/Decode is available in two versions:

Encode/Decode I provides a level of security suitable for normal use. Encode/Decode II provides enhanced security for the most demanding needs. Both versions come supplied on discette and with a complete user manual.

Encode/Decode I: \$50.00

Encode/Decode II: \$100.00

Manual alone: \$15.00

PROGRAMMING LANGUAGES

ENHANCED 'TINY' PASCAL: We still call it 'Tiny' but it's bigger and better than ever! This is the Famous Chung/Yuen 'Tiny' Pascal with more features added. Features include:

- recursive procedures/functions
- integer arithmetic
- CASE
- FOR (loop)
- sequential disk I/O
- one dimensional arrays
- IF ... THEN ... ELSE
- WHILE
- 'PEAK' & 'POKE'
- READ & WRITE
- REPEAT ... UNTIL
- more

'Tiny' Pascal is fast. Programs execute up to ten times faster than similar BASIC programs.

SOURCE TOO! We still distribute source, in 'Tiny' Pascal, on each discette sold. You can even recompile the compiler, add features or just gain insight into compiler construction.

'Tiny' Pascal is perfect for writing text processors, real time control systems, virtually any application which requires high speed. Requires: 36K CP/M. Supplied with complete user manual and source on discette: \$85.00.

Manual alone: \$10.00.

INTERCOMPUTER COMMUNICATIONS

TERM: a complete intercommunications package for linking your computer to other computers. Link either to other CP/M computers or to large timesharing systems. TERM is comparable to other systems but costs less, delivers more and source is provided on discette!

With TERM you can send and receive ASCII and Hex files (COM too, with included conversion program) with any other CP/M computer which has TERM or compatible package. Allows real time communication between users on separate systems as well as acting as timesharing terminal.

- Engage/disengage printer
- error checking and auto retry
- terminal mode for timesharing between systems
- conversational mode
- send files
- receive files

Requires: 32K CP/M.

Supplied with user manual and 8080 source code: \$100.00

Manual alone: \$15.00.

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ELECTRONIC MAIL: MORE TALK THAN ACTION?

Sending messages via computer hookup has generated a great deal of interest. But so far that's about it. The majority of businesses are taking a wait-and-see attitude, based primarily on cost justification. Management is insisting on "hard dollar" savings before installing *anything* these days. A survey carried out by International Data Corp. among manufacturing, petroleum, transportation, banking and insurance industries revealed only 23% have plans for using electronic mail. Another 38% indicated preliminary

planning and the majority of businesses are up in the air. This has led to frustration among systems planners who see many potential benefits of an electronic mail system, but are unable to justify it on management's terms. Is anticipated "soft dollar" savings—increased management productivity, better access to information, additional business opportunities, more efficiency—enough to justify its expenditure?

Another barrier is the lack in many companies of centralized data on the various forms of communications: Telex, facsimile, communicating word processors, computer-

based message systems, first class mail. Without cost data, it is difficult to make any intelligent trade-off between older systems and electronic mail. In addition, decision making is often fragmented among departments, i.e., the Telex/TWX network may be the responsibility of the telecommunications department, a computer-based message system could fall under data processing, and communicating word processors may come under the administrative services department.

CAR DEALERS GET MORE ACTION

In the fast-paced, competitive world of auto dealerships, last week's information is simply too late to make decisions today. Seeing this demand for up-to-the-minute sales and operations data, Reynolds and Reynolds and Texas Instruments teamed up to link thousands of data terminals that form a computer network integrating the several businesses that make up one dealership: new and used auto sales, parts, service and leasing departments.

Nicknamed VIM (Vital Information for Management) system, it enables a dealer to generate a unique service menu and provide immediate parts pricing and availability information, promoting customer satisfaction and quicker sales closings.

Dealers have their choice of two systems: VIM II which is an on-line service connecting terminals within a dealership to one of 96 host computer sites; and VIM III which is in-house and provides each dealership with its own minicomputer.

When a customer drives into the service aisle, an advisor can enter the vehicle's ID number and mileage into a terminal which then prints out the vehicle owner's name, service history and a menu of recommended items based upon that history. Once the price and availability have been determined, the entire invoice is printed at the point-of-sale, the customer is served quickly, and has an accurate, legible record of the transaction. The dealership saves time and automatically updates all departments in one easy step.

HOME INFO USERS TO TOP 24 MILLION IN 10 YEARS

Markets for telecommunications products and services to residence users in the U.S. will exceed \$75 billion by 1990, according to a report from International Resource Development Inc., a management consulting firm. The report attributes the expected increase to growing acceptance of new service features such as "custom calling service" and "store-and-forward voice," coupled with greater telephone usage resulting from high gasoline prices.

In the report, IRD predicts that by the end of the decade about one quarter of U.S. homes will be equipped to access new "home information services" based upon videotex and teletext (viewdata) technology.



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How do you get the best possible performance out of your acoustic modem? It's easy.

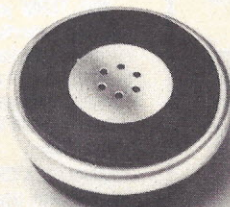
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Novation, Inc., 18664 Oxnard Street, Tarzana, California 91356

The report indicates that AT&T, GTE and several other companies are racing to complete trials of new interactive home information systems, which will have the capability of providing specialized news, directory information, video games and other entertainment upon demand. The systems will also be capable of providing electronic mail and several types of "transaction" services.

Some 24 million of an estimated 97 million households in the U.S. in 1990 will be equipped to access and utilize these services.

LATEST ENTRY IN CAI FIELD

The word from Benton Harbor, MI is that Heath has formed a subsidiary to be called Heath/Zenith Educational Systems. This latest Heath venture—seen by some industry observers as a necessary diversification—will develop and market instructional courses, textbooks and training equipment.

The new division's principal markets will be industry, government, schools and the individual. Undoubtedly, the focus will be on electronics, computer, automotive and related technologies.

Spokesmen for the company note that the division is an outgrowth of the learning programs which were originally developed and marketed to Heath's electronic kit hobbyists.

The spokesmen are also quick to point out that Heath/Zenith Educational Systems is licensed as a school by the State of Michigan and that all program offerings will be reviewed and approved by the National Home Study Council.

ANTI-WHEEL LOCK DEVICE DEVELOPED IN GERMANY

Microcomputers, custom designed by American Microsystems, Inc., of California, have been integrated into a new vehicle anti-skid brake control system developed in West Germany. The antiskid system, by Robert Bosch GmbH, Stuttgart, prevents wheels in a vehicle from locking by continuously sensing signals from the wheels.

On test tracks and highways in West Germany, the Bosch system has safely stopped cars on all kinds of road surfaces, both straight and curved. The system will be offered as an option on a number of European cars. No American manufacturer has incorporated the system.

COST OF DUMB TERMINALS DROPS

The intense competition of the computer terminal market produced deflationary pressures to drive the average cost of \$1,460 for dumb (non-programmable) terminals in 1978 down 10% to \$1,315 by the first of 1980, according to analysts of the GML Information Services. These same forces apparently chased 26 marginal models off the market by the end of 1978 with their places taken by 25 new entries in 1979, holding the number of dumb terminals on the market at an almost constant level. These terminals represent a little more than 15% of the total available terminal models.

ABS ANNOUNCES MICRO BUSINESS PACKAGES

An integrated series of financial application packages is available from American Business Systems. Included in the series are: accounts payable, accounts receivable, general ledger, order entry/billing, inventory control and payroll. The dealer price for each package is \$200.

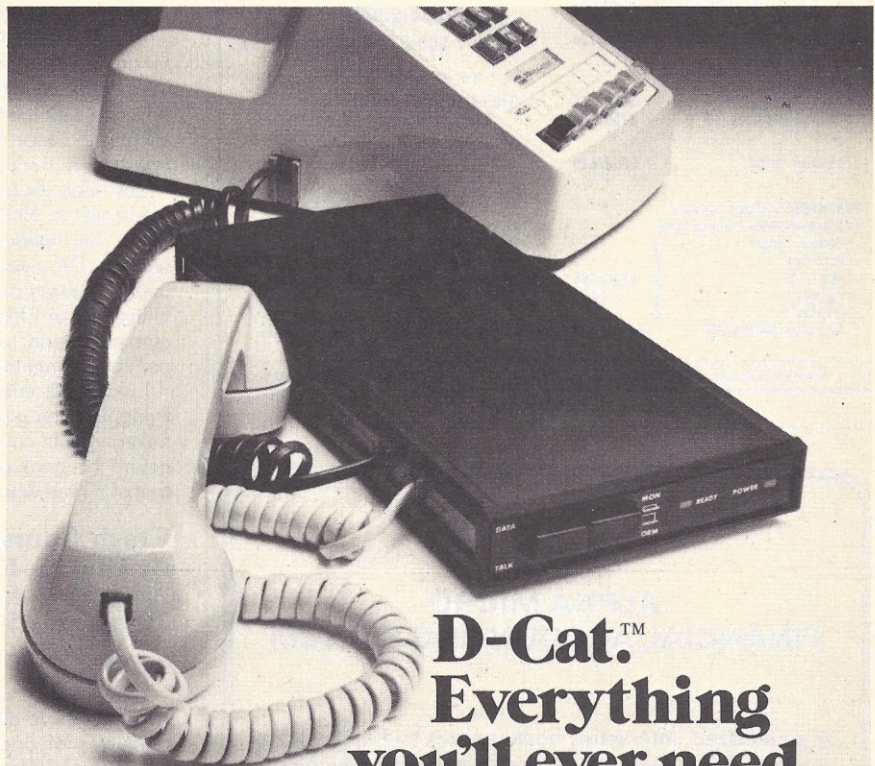
These Cobol-based products are intended for use on most microprocessor systems using floppy or hard disk storage. They feature report writers, multi-company support and both operator and technical documentation.

American Business Systems, Inc., 9 Goldsmith St., Littleton, MA 01460, (617) 486-3509.

IBM TAGS RED CHINA

The People's Republic of China has ordered a used IBM large-scale computer system equipped with 25 peripheral devices. It reportedly is the first such sale involving used large-scale computers manufactured in the U.S.

The system will be completely refurbished in the U.S. before its shipment to Peking. No purchase price was given.



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There's only one originate/answer modem that gives you the performance and reliability of a direct connect modem with the portability and price of an acoustic. Novation's new D-Cat.

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The PJA Accounting System with documentation is available for \$500.

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CIRCLE INQUIRY NO. 57

BOOK REVIEWS

From Dits to Bits: A personal history of the electronic computer

By Herman Lukoff. Robotics Press, Portland, OR
 209 pages, \$12.95

Reviewed by Les Spindle

"Even as a kid, I wasn't ordinary."

The opening sentence of this quasi-autobiography reinforces the stereotype of the computer buff as a zonked-out, eccentric mad scientist. The curious thing about Lukoff's book is that it ironically refutes this. Lukoff's memoir is a survey of the early development of the computer coupled with a first-person profile of one of its pioneers. The unique aspect to Lukoff's approach is the welcome human insight that he adds to the impersonal world of circuits, bytes and digits. His sense of humanity explodes the stereotype and embellishes the highly technical material.

Unfortunately, the schizophrenic style that is the book's greatest asset also proves to be its severest liability. Human interest is an apt antidote for dry technical terminology, but only when it blends in with the forward thrust of the narrative. When the story of the birth of the computer dovetails with the life of Lukoff and his family, the book maintains an effective balance. When it digresses to unrelated personal events, or bogs down in scientific terminology, the book loses its central focus.

The story begins with Lukoff's early years as a fat, reclusive youngster in Philadelphia, who chose to tinker with wires inside rather than follow his father's protestations to go out and practice boxing. The events of his life are described alongside his revolutionary contributions to computer development: his years at the University of Philadelphia when he worked on the primitive Eniac computer, and his years with Remington Rand, when he helped perfect the trail-blazing Univac series.

Lukoff adds enough personal detail to make the point that he was a living, breathing being and not an automaton who spent all his time tinkering with computers. He died of leukemia in late 1979, weeks before this book went to press. Despite its lapses, it is a moving portrait of a man who devoted his entire life to computer technology. □

Crash Course in Microcomputers

By Louis E. Frenzel, Jr.
 Howard W. Sams, Indianapolis, IN
 264 pages, \$17.50

Reviewed by Kathy Tekawa

Whenever a tutorial book on microcomputers is published, it never seems to differ much from the rest. It tends to concentrate on principles of operation and nothing more. In *Crash Course in Microcomputers*, however, there are some important differences.

This is not a conventional reference text, but more a correspondence course designed for the do-it-yourselfer. No previous knowledge of computers is needed to understand Frenzel's presentation. His attempt to write a simple book on a complex subject is carried out in a novel style and approach.

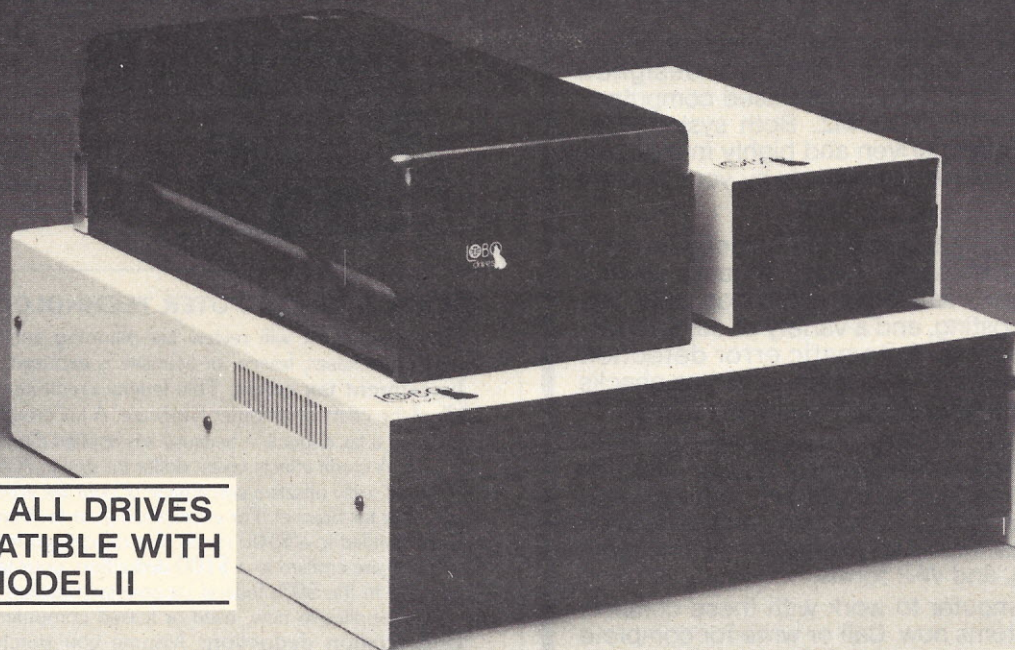
Chapters are set up in a unique format with information broken down in short, chronological sections. At the end of each section, there is a fill-in-the-blank-type review which quizzes the reader on just-learned material. The answers appear immediately in the simulated program frame in parentheses below. This format makes digesting such unfamiliar material a little easier.

There are 14 chapters, each beginning with a learning objective, stating what will be covered. Example: the first chapter entitled Microcomputer Basics states, "When you complete this unit you will be able to: define terms, list and explain basic functions of a computer, etc." This helps the reader to zero in on topics chapter-by-chapter.

Each chapter ends with a test, advantageous only if the reader uses the book correctly. To gain the most from this crash course, a chapter should be completed at a time. If not, continuity is lost and it is difficult to recall the information. Fortunately, Frenzel provides the answers behind the tests for those who want to steal a peek.

Although some units may be complex and some tests may strain the novice, these are minor drawbacks to a book that is well written, generates interaction and enables the reader to learn and retain information. □

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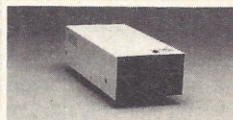
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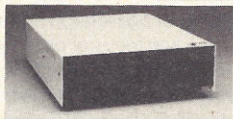
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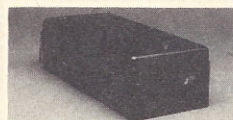


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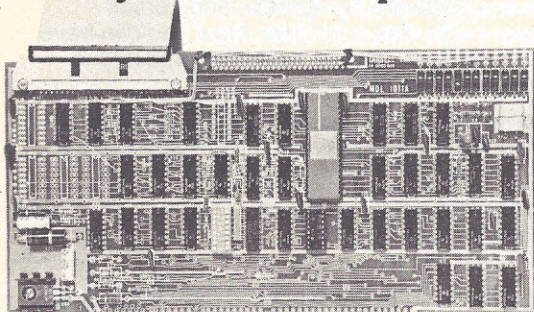
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JURISPRUDENT computerist



By Elliott MacLennan
Attorney at Law

TAXATION OF COMPUTER TECHNOLOGY: PART I

This column we will review tax planning and some pitfalls to which a purchaser, lessee, or licensee is exposed.

Investment tax credit: This federal credit can be worth up to 10% of the cost of computer hardware. A tax credit is almost always better than a tax deduction because it is applied directly against the tax you owe. A credit effects taxes, dollar for dollar. A deduction, on the other hand, only offsets a percentage of your tax burden; that percentage is your tax bracket. For example, if your tax burden is \$100 and you are entitled to a \$100 credit, this cancels your taxes. If you owe \$100 and are entitled to a \$100 deduction, your tax burden is \$50 (if you are in the 50% federal income tax bracket). The investment tax credit applies to new, used or leased computer hardware.

Depreciation deduction: Assume you purchase a hardware system for \$18,000 and the useful life of that system is 6 years, after which the technology becomes outdated and unsalvageable. You are then entitled to an income tax deduction of \$3,000 a year for six years. When deducting the cost equally over the period of its useful life, you are said to be taking a "straight-line" deduction. Note, however, that there are accelerated depreciation schemes that enable you to recoup cash outlay more quickly. Remember these points about depreciation deductions: if you fail to take the deduction for one year or two you cannot double or triple it in future years; depreciation deductions can be taken for purchases in addition to investment tax credit for the same purchases.

Bonus depreciation: Besides these deductions, you can make a one time deduction of 20% of the system's cost. This "bonus" depreciation requires that the hardware have a useful life of 6 years minimum. You are not entitled to an extra 20% depreciation; you write off the cost of your purchase faster than you could using straight-line-depreciation. Bonus depreciation is helpful because it allows you to pay less tax in the same year you incurred the down payment or total cost.

Sales and use tax: These differ from the credit and deduction in that they are taxes that must be paid. A sales tax is imposed by many tax authorities on the purchase price of the equipment; a use tax is imposed on recurring lease rentals. Both can be as high as 10% of the total cost. Each taxing authority applies different criteria for what items are taxable. Ferret out the laws particular to your jurisdiction to assess their impact. Assume a vendor leases a system to a customer where a sales or use tax is operative. If maintenance charges are "bundled" into the lease rental and the taxing authority does not tax maintenance charges, an unnecessary tax has been paid.

Tangible personal property tax: This can be as high as 7% of the current property value. Not every jurisdiction enforces this tax; nor is there a uniform definition of it. "Property" means something of value. "Personal" means personal property as opposed to real estate. It does not mean "personal" in the sense of a personal possession such as a watch or pair of eyeglasses. "Tangible" is the key focus of our inquiry, as opposed to intangible. An I/O unit is tangible, a promise is not. Each taxing authority classifies software as it desires. If a jurisdiction does not tax software considering it "intangible" personal property, it would behoove the software purchaser or licensee to not have the hardware "bundled" with the software. The taxing authority would probably attempt to tax the entire bundled amount.

Tax planning is best made prior to acquisition. It is important to match the applicable tax law with the invoice, rental charge, or license, and to classify an acquisition to legitimately avoid overpayment. Readers should consult professional advisors prior to applying this material to a specific situation. □

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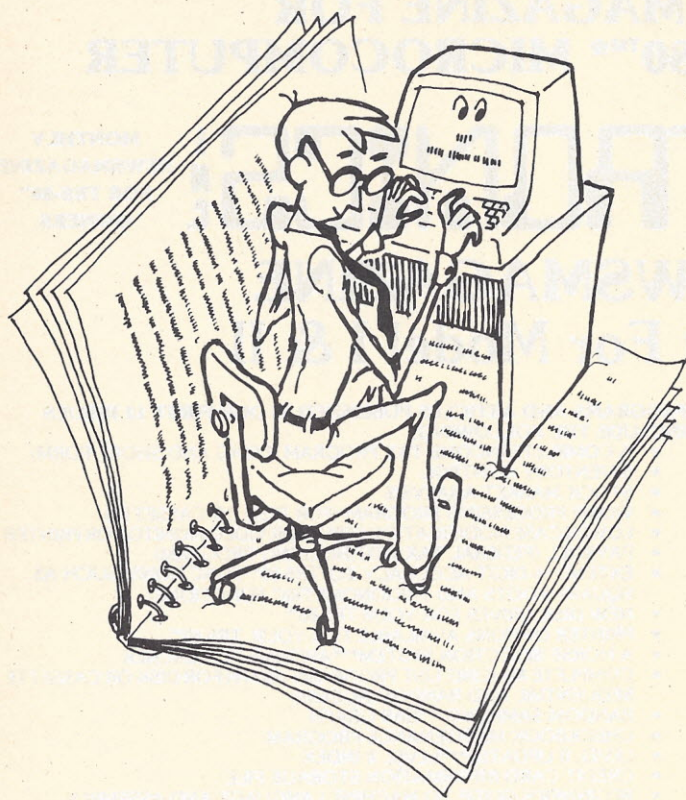
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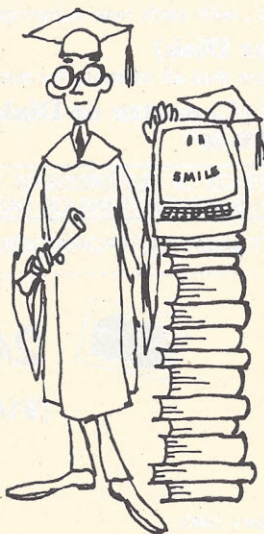


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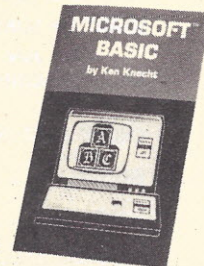
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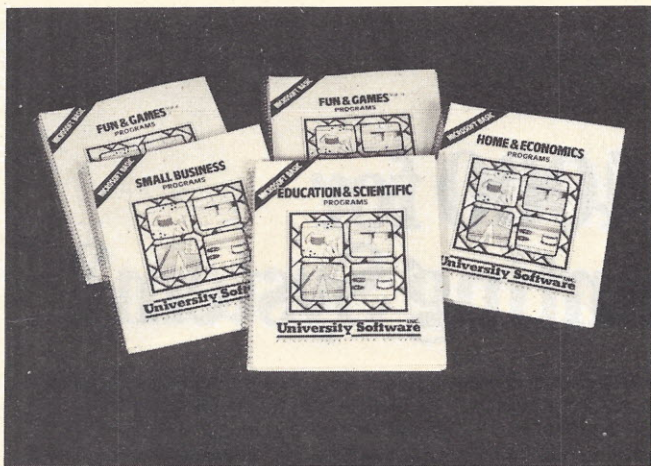
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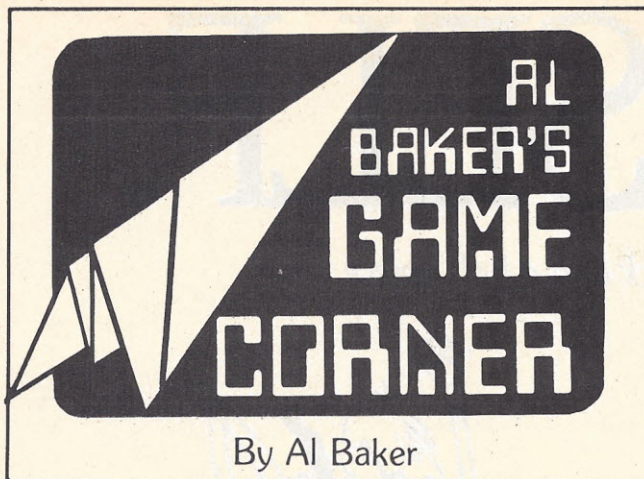
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Likewise, "V" is the vertical velocity. If it is greater than zero, you are moving down; and if it is less than zero, you are moving up. Your spaceship is the blinking spot at the center of the screen. The asteroids are scattered over the screen, numbered 1 to 9 representing each asteroid's value. Your score is the sum value of all asteroids reached within time and fuel limits.

But watch out! If you hit an asteroid too fast, you crash. To mine an asteroid safely, both U and V must be between -5 and +5.

Move the ship by pressing the arrow keys. As long as an arrow key is held down, you will accelerate in that direction. Let go of the

key and you will stop accelerating and move in a straight line forever. You don't have to keep pumping a key to move. To stop, hold down the opposite arrow key until you come to a stop.

THE PROGRAM

The game is initialized beginning at line 500. All variables are integers. X and Y are the spaceship's current position on the screen times 10. These numbers are divided by 10 when the spaceship is put on the screen. U and V are its horizontal and vertical velocities.

Lines 700 through 780 place nine asteroids on the screen. Line 720 picks a random screen location between the second and bottom lines. Lines 730 to 750 make sure that we don't pick a location containing an asteroid. We put the asteroid on the screen at line 770. This line puts a single digit on the screen without a preceding blank.

Lines 110 to 390 are the game loop. The program prints the vital statistics, then checks to see if the rocket pilot is firing his engines. We don't use the INKEY\$ function or INPUT for this. Instead we use this table:

PEEK (14400) =	Key being pressed
8	↑
16	↓
32	←
64	→

INPUT is avoided because we don't want to require the use of the ENTER key. I avoided using the INKEY\$ for two other reasons. First, using PEEK is faster. Second, using PEEK (14400) lets the player hold the keys down for constant input. As long as the "←" arrow key is held down, PEEK (14400) will equal 32.

Lines 230 to 270 remove the ship from the screen and change its location based on the current U and V accelerations. Lines 250 and 270 are the program's wrap-a-round logic. If the ship moves off the left or right edge, line 250 brings it back on the other edge. If the ship moves off the top or bottom edge, line 270 brings it back on the other edge.

Lines 330 and 340 determine if we have moved into an asteroid. Location 15360 is the upper left edge of the screen. INT (Y/30)*64 is the line containing the ship and INT (X/20) is its position on the line. □

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PROGRAM LISTING

```

10 REM ... MINING THE ASTEROIDS ...
20 REM
30 REM
40 REM
50 REM GO INITIALIZE STUFF
60 REM
70 GOTO 500
80 REM
90 REM HERE IS THE MAIN GAME LOOP- FIRST GIVE THE PRINT-OUT
100 REM
110 PRINT@W;"TIME=";TI;" SCORE=";SC;" FUEL=";FU;" U=";U;" V=";V;" ";
120 REM
130 REM SCAN THE KEYBOARD FOR ARROW KEYS.
140 REM UPDATE FUEL AND VELOCITY
150 REM
160 IF PEEK(14400)=8 THEN V=V-1 :FU=FU-1
170 IF PEEK(14400)=16 THEN V=V+1 :FU=FU-1
180 IF PEEK(14400)=32 THEN U=U-1 :FU=FU-1
190 IF PEEK(14400)=64 THEN U=U+1 :FU=FU-1
200 REM
210 REM MOVE SHIP AND UPDATE COORDINATES
220 REM
230 RESET(X/10, Y/10)
240 X=X+U
250 IF (X/1270)+(X/8) THEN X=1270-X+U
260 Y=Y+V
270 IF (Y/470)+(Y/30) THEN Y=500-Y+V
280 REM
290 REM UPDATE TIME AND SEE IF THERE IS A HIT
300 REM IF NOT, FINISH MOVE, HANDLE END CONDITIONS, AND LOOP
310 REM
320 TI=TI-1
330 A=PEEK(15360)+INT(Y/30)*64+INT(X/20)
340 IF (A/32)*(A/128) THEN 440
350 SET(X/10, Y/10)
360 IF TI<0 THEN 830
370 IF FU<0 THEN 840
380 IF SC<45 THEN 850
390 GOTO 110
400 REM
410 REM HIT SOMETHING. IF TOO FAST, TOO BAD
420 REM IF SLOW ENOUGH, ADD TO SCORE
430 REM
440 IF (ABS(U)>5)+(ABS(V)>5) THEN 870
450 SC=SC+A-48
460 GOTO 350
470 REM
480 REM INITIALIZATION
490 REM
500 DEFINT A-Z
510 REM
520 REM X AND Y ARE CURRENT SHIP LOCATION TIMES 10
530 REM
540 X=640
550 Y=240
560 REM
570 REM U AND V ARE THE X AND Y SHIP VELOCITIES, RESPECTIVELY
580 REM

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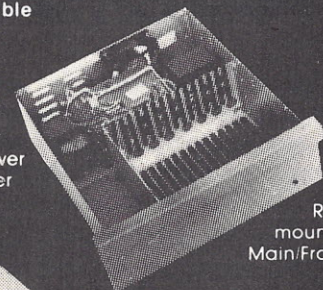
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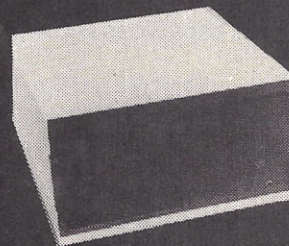
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```
580 U=0
600 V=0
610 CLS
620 FUEL=500
630 SC=0
640 TIME=500
650 REM
660 REM PLACE THE 9 RANDOM DIGITS ON THE SCREEN
670 REM THE N ARRAY IS USED TO PREVENT PLACING ONE DIGIT
680 REM ON TOP OF ANOTHER
690 REM
700 RANDOM
710 FOR I=1 TO 9
720 A=RND*(959)+64
730 FOR J=1 TO 9
740 IF N(J)=A THEN 720
750 NEXT J
760 N(I)=A
770 PRINT@A,RIGHT$(STR$(I),1);
780 NEXT I
790 GOTO 110
800 REM
810 REM ENDING MESSAGES
820 REM
830 PRINT:PRINT"TIME'S UP":END
840 PRINT:PRINT"OUT OF GAS":END
850 PRINT:PRINT"CONGRATULATIONS! YOU GOT ALL THE ASTEROIDS."
860 END
870 PRINT:PRINT"C R A S H !!! WHO'S NEXT?":END
```

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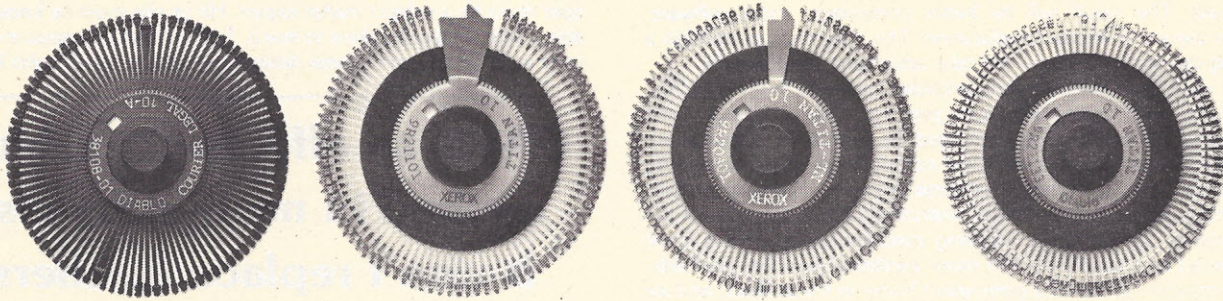
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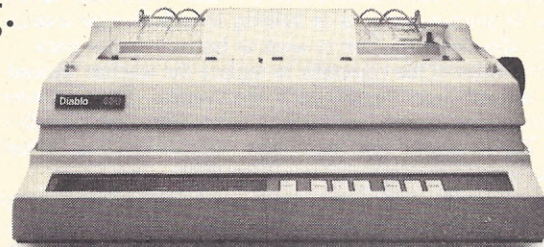
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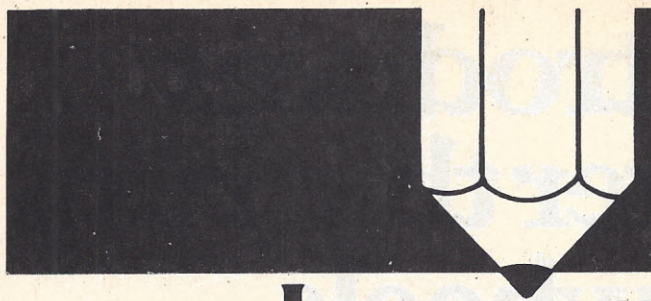
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Learning with Micros

By Louis E. Frenzel, Jr.

COMPUTERS, EDUCATION AND CAI

Education plays a major role in the growth of the microcomputer industry. And microcomputers are revolutionizing education by changing what schools teach and how they teach it. The computer-education relationship is so big, so important and so necessary that it should not go unreported. It should be enhanced, nurtured and discussed. The result will be better computers, more software, smarter users and improved education. This column is to establish a running dialog to achieve—and take advantage of—this goal.

Ever since the low-cost microcomputer appeared in the mid 70s, it has been a solution looking for a problem. One of its really valid and useful applications has emerged in education. Schools are beginning to buy low-cost personal computers to implement computer literacy and computer awareness programs and to teach programming. And computer aided instruction (CAI)—the use of the computer as an interactive teaching machine—is becoming more widespread as a supplement to more traditional teaching methods. The computer has found a permanent home in the schools, and we will see more and more of them in the years to come.

This column will investigate computers and education, and the ways they entwine. We hope to cover all aspects of how computers and education help enhance and complement one another. I will be reporting monthly on some particular aspect of this synergistic combination. If you have any specific needs or interests, let me know. If you as a hobbyist, teacher, manufacturer, retailer, publisher are doing something unique with computers and education, I will report on it here.

CAI is one of the most talked about applications for microcomputers. It is so important, that I have chosen it as my first topic of discussion.

CAI PRIMER

CAI is the use of a computer as an interactive teaching machine. The computer becomes a one-on-one tutor for the student. Learning material is programmed into the computer, and the student simply calls it up in sequence at his own pace. The computer is a good learning facilitator. It has proven effective in teaching a wide variety of subjects. Its primary value is in helping to individualize instruction, that is, allow each student to work at his or her own pace.

It is not the intent of the computer to replace the teacher. Instead, it expands and enhances the teacher's effectiveness. The computer can perform routine chores, leaving the teacher more time for individual help. The computer also helps slow students catch up or fast students go beyond average and slower students.

CAI is an outgrowth of developments in psychology, education and computers. All of these came together in the late 50s and early 60s. Psychologists discovered that effective learning took place if the instruction was "programmed" where the material to be learned is divided up into short segments and presented sequentially with plenty of testing and feedback. With this discovery, programmed instruction or PI was born. Early PI was implemented in printed form. In the 60s, teaching machines were invented. These machines used slides, filmstrips, audio cassettes, and other media to automate presentation.

But CAI is more than just PI on a computer. It is also the use of the computer for drill and practice, the repetitive presentation of problems and questions for the development of skills or the review of facts. This type of CAI is good for learning math. Testing is another

good CAI application. The computer can represent a series of problems or questions, indicate right and wrong answers, keep score, and compute a grade.

Another form of CAI is simulation. Here the computer is programmed to solve an equation or set of equations that represent some physical, economic or social system. Such simulations can be altered and experimented with to determine the outcome of various changes in input variables. A good example is a business application where factors such as materials and labor costs, marketing expenditures, interest rates, inflation, and many other parameters can be varied to predict sales and profitability. Such simulations are really learning games. They are fun and truly an effective learning method.

While CAI has shown itself to be a good way to teach and has been used on computers over the past 20 years, it has never really lived up to the potential accorded it. Why? Well, the main reason is cost. Control Data's Plato has been around for years, and is one of the best CAI systems available. But few can afford it. IBM, DEC and others have offered CAI capability for over a decade, but only large schools can afford it. With the availability of the micro, however, cost is no longer a problem.

CAI—PRO AND CON

But if CAI is so great, why isn't it more widely used? The answer lies in one word—software. Software, or in the case of CAI, courseware, is the teaching program that the computer presents to the student. Courseware is difficult to develop. First, the courseware developer must be a subject matter expert. He or she must be knowledgeable in the subject he plans to teach. Second, the courseware developer must be an instructional designer. This is a person who knows

CAI is an effective teaching method in many subjects. It won't replace teachers or lecturers or lab work, but it will be a great supplementary learning tool.

how to structure, sequence, divide and present the material to be learned. And finally, the courseware developer must be a programmer. He or she must be able to program the computer with the material to be learned. Higher level languages like BASIC and FORTRAN are most widely used, but special CAI languages such as IBM's Course Writer, DEC's Decal, Control Data's Tutor and Pilot have been developed. The problem is this: How do you find all of these capabilities in one person?

One solution is to divide up the development task amongst several individuals. In other words, create a CAI development team. This, of course, can work but it is more costly, inefficient and time consuming.

Usually CAI is written for one specific computer. Typically it cannot be easily transferred to another machine. A CAI program written for a cassette based Apple II cannot be directly used on a disk-based TRS-80. Storage formats, graphics, and even the dialects of BASIC are different on the two machines. A conversion can be made, of course, but not without a major rework.

Now you can see why no major CAI publishers have emerged to produce courseware for micros. It is a tough job to get the CAI written in the first place much less get it reproduced in several different formats. On top of this, some kind of distribution network must be established to get the courseware to the user. And, of course, the publisher has to do all of this at a profit.

Despite the problems, CAI is alive and well. There is a trickle of courseware flowing from manufacturers, software houses, publishers and a few brave, talented individuals. Hopefully more will come because CAI does have its good points. It is an effective teaching method for many subjects. No, it won't replace teachers, lecturers or lab work, but it will be a great supplementary learning tool. □

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BASIC COMPILER	●	●	□	●	
FORTRAN-80 COMPILER	●	●	□	■	●
COBOL-80 COMPILER	●	●		●	
muMATH/muSIMP muLISP	●		□		
MICROSEED DBMS	●				
EDIT-80 TEXT EDITOR	●		□	■	
MACRO-80 ASSEMBLER	●	●	□	■	●

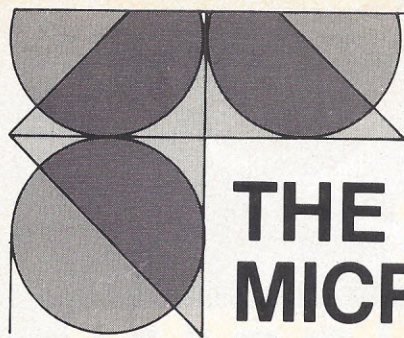
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THE MICRO-MATHEMATICIAN

By Dr. Alfred Adler

REVIEW OF PROGRAM MORTPAY

As long as people continue to buy things that they do not pay for immediately, the problem of time payments will be with us. More often than not, major items such as vehicles of all sorts, home improvements and vacations are paid for on time. Houses and land are almost always paid for in this way. Some time ago we needed a program that would accept the fixed parameters of an installment debt and permit us to compute the amount of the periodic payment, and other useful information regarding the progress of debt retirement.

In the Aug/Sep issue of Interface Age we presented Program MORTPAY. This program accepts as input the amount of the debt, the rate of interest, the number of payments per year, the number of years over which the debt is amortized, and whether or not a balloon payment (a large final payment to retire the debt) will be required and when. As output, the program furnishes a restatement of the input information, the amount of the periodic payment, the amount of the balloon payment if any, the total interest paid over the lifetime of the debt, and the total amount paid for both principal and interest over the lifetime of the debt. In addition a payment by payment table giving the payment breakdown between principal and interest (called an amortization table), is furnished upon request. The real problem is the computation of the periodic payment to fit the given constraints. Once the periodic payment is available, the rest of the computation is trivial. The derivation and required equations are presented in the Aug/Sep column.

This program has served well through a number of transactions. However, a situation arose at one point where the seller required a specified periodic payment of his choice. Unfortunately, Program MORTPAY was not equipped to handle this except by trial and error, which is definitely not the way to go.

As long as it is necessary to revise MORTPAY to include the ability to accept a predetermined periodic payment, it was thought advisable to take the opportunity to include a number of other desirable features. Since, as stated above, the only difficult part of these calculations is that of the periodic payment, the new program involved no new mathematical problems. However, the added housekeeping was considerable.

The equations underlying Program MORTPAY are not repeated in this article. It is assumed that most readers have already seen the Aug/Sep issue, or can obtain one fairly easily if desired.

PROGRAM PAYMENT

The new program, called PAYMENT, includes all the features of MORTPAY. In addition, for a specified periodic payment, it computes the number of years over which payments must be made, as well as the amount of the odd final payment. Two extra columns have been added to the amortization table; namely, the principal remaining to be paid, and the interest paid to date. The latter is directly useful at income tax time.

When the program is run using the predetermined periodic payment option, it is possible to specify a value of the payment that is not sufficient to even pay the interest. An error return is included in the program to inform the user of such an event, which would otherwise cause massive and catastrophic crashing of the program.

At the end of an amortization table, the interest and principal totals are given. These totals may not agree to the penny with the information given in the output. Actually both are in a sense correct. The amounts in the output are exact, as are the amounts that should be paid. The totals at the bottom of the amortization tables are the amounts that will actually be paid due to the requirement that each periodic payment be rounded off to the nearest penny.

A complete listing of Program PAYMENT is presented at the end of this column. As has become customary, the program is written in North Star BASIC, release 5.0. Program MORTPAY was presented in PolyMorphic BASIC, version A00, but should run in North Star since it contains no multiline IF statements, and no other doo-dads that are not common to both systems.

Anyone who is sufficiently curious to run the same data on both MORTPAY and PAYMENT will find what he is looking for; namely a discrepancy between the two programs. The interest and principal totals at the end of the amortization table from PAYMENT are more accurate than those from MORTPAY. The reason is that North Star BASIC, in which PAYMENT is written, uses BCD arithmetic, which permits any decimal number to be represented exactly in binary, as opposed to a straight decimal to binary conversion in which some decimal numbers, for example .1, cannot be represented exactly.

It is necessary to point out that this program is written for use under the conventions usually followed for mortgages in the United States. Other countries have different conventions which I know little of, am less interested in, and certainly take no responsibility for.

The cycling of this program is sufficiently complex that each possible route should be checked out. For that reason, five sample runs are included, one for each possible route through the program.[]

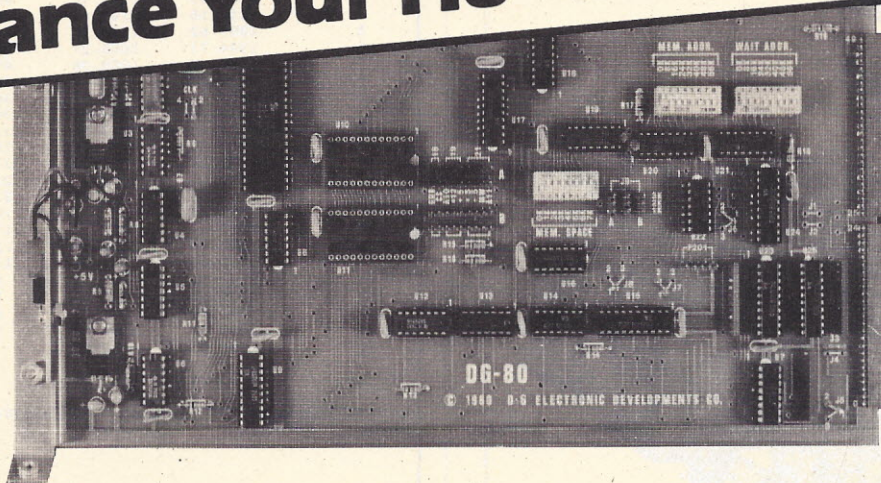
PROGRAM LISTING

```

5 REM*****
10 REM
15 REM $$$$$$ P r o g r a m   P A Y M E N T $$$$$$$
20 REM
25 REM***** Version 1.0 *** February 1979 *****
30 REM
35 REM***** Written by - Alfred A. Adler Ph.D. $$$$$$$$
40 REM
45 !*****
50 !
55 !$$$ Program PAYMENT - by A.A.Adler - ,
60 !2/13/80, 12:45 PM,
65 ! $$$
70 !*****
75 !
80 !Assume a debt of P dollars, with an interest rate of R %
85 !per year. Equal payments of M dollars each are to be
90 !made, at the rate of T payments per year calculated over
95 !a period of Y years. Possibly at the end of Z (less
100 !than Y) years the debt will be retired with a single
105 !balloon payment of B dollars."
110 !
115 !Alternatively, some investors prefer that M be preassigned
120 !at some convenient amount. This results in a nonstandard
125 !final payment if there is no balloon payment."
128 DIM P(360),I(360)
130 !\----- INPUT DATA -----"
140 INPUT "IS M TO BE CALCULATED OR STATED, C OR S ? ",M$
145 IF M$="S" THEN 302
148 REM ***** INPUT FOR CALCULATED M
150 INPUT "WILL THERE BE A BALLOON PAYMENT ? ",B$
155 IF B$="NO" THEN 170
160 !\INPUT "STATE THE VALUES OF P,R,T,Y,Z : ",P,R,T,Y,Z
165 GOTO 180
170 !\INPUT "STATE THE VALUES OF P,R,T,Y : ",P,R,T,Y
180 R=R/(100*T)
185 N=Y*T
190 K=(1+R1)*N
195 M=P*R1*K/(K-1)
198 IF B$="YES" THEN 205
200 A=M*N/I=A-P/GOTO 235
205 P8=M*T*Z/REM P8=Total payments before balloon payment.
210 P9=(M-P*R1)*((1+R1)^(T*Z)-1)/R1
215 REM P9=Total principal before balloon payment.
220 B=P-P9
225 I=P8-P9
230 A=P8+B
235 REM ***** OUTPUT FOR CALCULATED M
238 !\----- OUTPUT -----"
239 !
240 !DEBT = ",$BFO,P,TAB(20),"INTEREST RATE = ",$F2,R,"%"
245 !TO BE PAID OFF AT THE RATE OF",T," EQUAL PAYMENTS PER"
250 !YEAR, CALCULATED OVER A PERIOD OF",Y," YEARS."
255 !\EACH PAYMENT WILL BE ",$F10F2,M
260 !THE TOTAL INTEREST WILL BE ",$F10F2,I
265 !AND THE TOTAL AMOUNT PAID WILL BE",,$F11F2,A
270 IF B$="NO" THEN 485
275 REM Output for calculated M and nonzero balloon payment.
280 !\AT THE END OF",Z," YEARS A BALLOON PAYMENT OF",,$F11F2,B
285 !WILL RETIRE THE DEBT."
290 P7=0,I7=0
295 GOTO 485
300 REM ***** INPUT FOR STATED M
302 INPUT "WHAT IS THE VALUE OF M ? $ ",M

```


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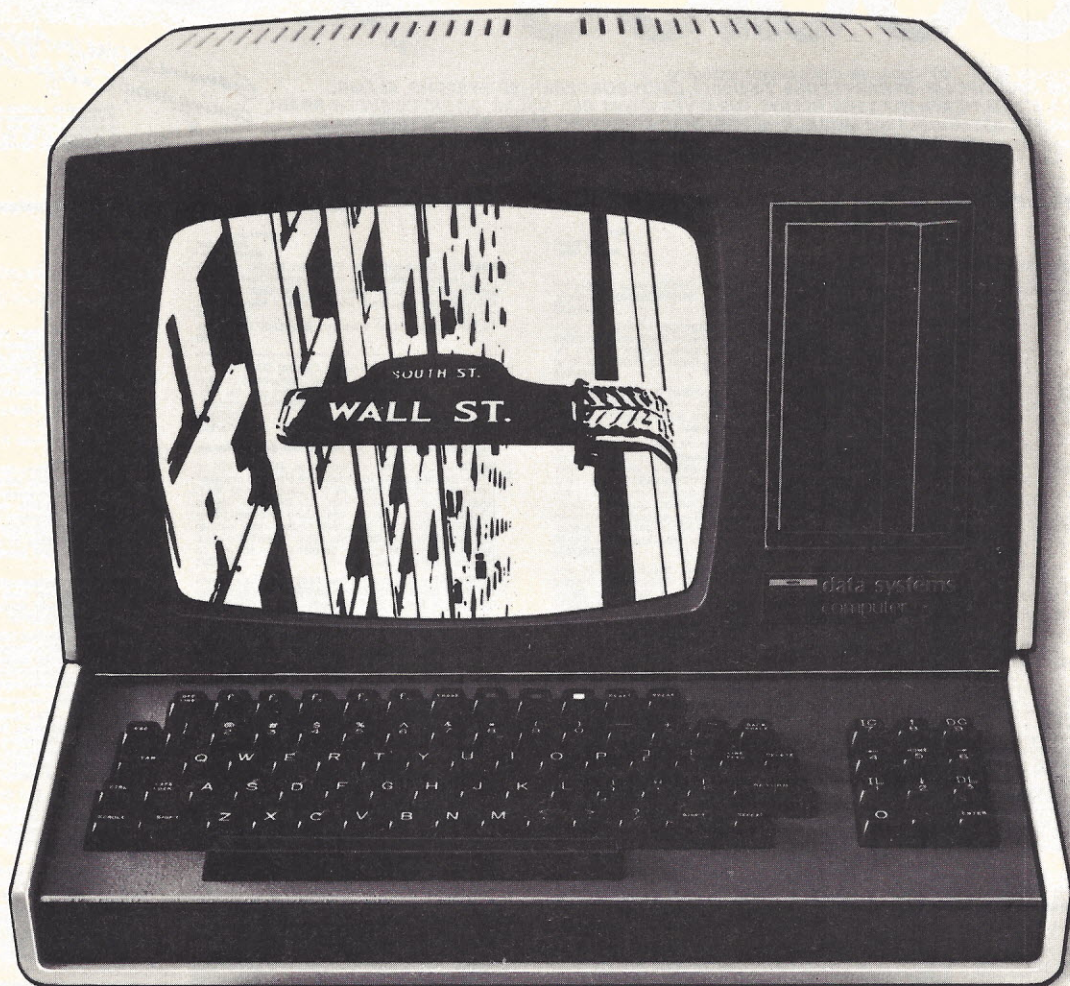
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North Star Double Density	1.4	145/25
North Star Double/Quad	2.X	170/25
ICOM Micro-Disk 2411	1.4	145/25
ICOM 3712	1.4	170/25
ICOM 4512	2.X	170/25
Mita 3202/Altair 8800	1.4	145/25
Heath H8 & H17	1.4	145/25
Heath H89	1.4	145/25
Heath H89 by Magnolia	1.4	200/25
TRS-80 Model I	1.4	145/25
TRS-80 Model II	2.X	170/25
Processor Technology Helios II	1.4	145/25
Cromemco System 3	1.4	145/25
Intel MDS Single Density	1.4	145/25
Intel MDS Single Density	2.X	170/25
Intel MDS 800 Double Density	2.X	200/25
Intel MDS 230 Double Density	2.X	200/25
Micropolis Mod I	1.4	145/25
Micropolis Mod II	1.4	145/25

The following configurations are scheduled for release during the first half of 1980:

tion includes CP/M 2.0 manuals)		\$300/\$50
<hr/>		
 Z80 DEVELOPMENT PACKAGE —Consists of: (1) disk file editor, (2) both global inter- and intra-file facilities; (3) Z80 relocating assembler; (4) Zilog/Mostek monitors, conditional assembly and cross reference table capabilities; (3) linking loader producing absolute Intel hex disk file		\$95/\$20
 ZDT - Z80 Monitor Debugger to break and examine registers with standard Zilog/Mostek mnemonics. Also displays assembly displays. \$35 when ordered with Z80 Development Package		\$50/\$10

Software consists of the operating system, text editor, assembler, debugger and other utilities for file management and system maintenance. Complete set of Digital Research's documentation and additional implementation notes included. Systems marked * and ** include firmware on 2708 and 2716. Systems marked + include 5440 media change. Systems marked @ require the special @ versions of software in this catalog. Systems marked v have minor variants available to suit console interface of system. @ includes hardware addition to allow our standard versions of software to run under it. Call or write for full list of options.

MP/MT - Intel MDS single density only (Documentation includes CP/M 2.0 manuals) \$300/\$50

Z80 DEVELOPMENT PACKAGE - Consists of: (1) disk file line editor, with global inter- and intra-line facilities; (2) Z80 relocating assembler, Zilog/Mostek mnemonics, conditionals and cross reference; (3) linking loader producing absolute Intel hex disk file \$95/\$20

ZDT - Z80 Monitor Debugger to break and examine registers with standard Zilog/Mostek mnemonic disassembly displays. \$35 when ordered with Z80 Development Package \$50/\$10

XASM-68 - Non-macro cross-assembler with nested conditionals and full range of pseudo operations. Assembles from standard Motorola MC68000 mnemonics to Intel hex \$200/\$25

XASM-68 - As XASM-68 for MOS Technology MCS-6500 series mnemonics \$200/\$25

DISTEL - Disk based disassembler to Intel 8080 or TDL/Xitan Z80 source code, listing and cross reference files. Intel or TDL/Xitan pseudo ops optional. Runs on 8080 \$65/\$10

DISILOG - As DISTEL to Zilog/Mostek mnemonic files. Runs on Z80 only \$65/\$10

MICROSOFT

BASIC-80 - Disk Extended BASIC, ANSI compatible with long variable names, WHILE/WEND, chaining, variable length file records \$325/\$25

BASIC COMPILER - Language compatible with BASIC-80 and 3-10 times faster execution. Produces standard Microsoft relocatable binary output. Includes MACRO-80. Also linkable to FORTRAN-80 or COBOL-80 code modules \$350/\$25

FORTRAN-80 - ANSI 66 (except for COMPLEX) plus many extensions. Includes relocatable object compiler, linking loader library with manager. Also includes MACRO-80 (see below) \$425/\$25

COBOL-80 - Level 1 ANSI '74 standard COBOL plus most of Level 2. Full sequential, relative, and indexed file support with variable file names. STRING, UNSTRING, COMPUTE, VARYING/UNTER, EXTEND, CALL, COPY, SEARCH, 3-dimensional arrays, compound and abbreviated conditions, nested IF. Powerful interactive screen-handling extensions. Includes compatible assembler, linking loader, and relocatable library manager as described under MACRO-80 \$700/\$25

MACRO-80 - 8080/Z80 Macro Assembler. Intel and Zilog mnemonics supported. Relocatable linkable output. Loader, Library Manager and Cross Reference List utilities included \$149/\$15

MACRO-86 - 8086 cross assembler. All Macro and utility features of MACRO-80 package. Mnemonics slightly modified from Intel ASM86. Compatibility data sheet available \$275/\$25

EDIT-80 - Very fast random access text editor for text with or without line numbers. Global and intra-line commands supported. File compare utility included \$89/\$15

PASCAL/M - Compiler generates P code from extended language, implementation of standard PASCAL. Supports overlay structure through additional procedure calls and the SEGMENT procedure type. Provides convenient string handling capability with the added variable type STRING. Untyped files allow memory image I/O. Specify 8080, Z80 or Cromemco when ordering. Requires 56K CP/M \$175/\$20

PASCAL/Z - Z80 native code PASCAL compiler. Produces optimized, ROMable re-entrant code. All interfacing to CP/M is through the support library. The package includes compiler, Microsoft Compatible relocating assembler and linker, and source for all library modules. Variant records, strings and direct I/O are supported. Requires 56K CP/M and Z80 CPU \$395/\$25

PASCAL/MT - Subset of standard PASCAL. Generates ROMable 8080 machine code. Symbolic debugger included. Supports interrupt procedures. CP/M file I/O and assembly language interface. Real variables can be BCD, software floating point, or AMD 9511 hardware floating point. Version 3 includes Enumeration and Record data types. Manual explains BASIC to PASCAL conversion. Requires 32K \$250/\$30

ALGOL-60 - Powerful block-structured language computer featuring economical run-time dynamic allocation of memory. Very compact (24K total RAM) system implementing almost all Algol 60 report features plus many powerful extensions including string handling direct disk address I/O etc. Requires Z80 CPU \$175/\$20

CBASIC-2 Disk Extended BASIC - Non-interactive BASIC with pseudo-code compiler and run-time interpreter. Supports full file control, chaining, integer and extended precision variables, etc. \$120/\$15

MICRO FOCUS

STANDARD CIS COBOL - ANSI '74 COBOL standard and compiler fully validated by U.S. Navy tests to ANSI level 1. Supports many features to level 2 including dynamic loading of COBOL modules and a full ISAM file facility. Also, program segmentation, automatic debug and error recovery, interactive extensions to support protected and unprotected CRT screen formatting from COBOL programs used with any dumb terminal \$850/\$50

FORMS 2 - CRT screen editor. Output is COBOL data descriptions for copying into CIS COBOL programs. Automatically creates a query and update program of indexed files using CRT protected and unprotected screen formats. No programming experience needed. Output program directly compiled by STANDARD CIS COBOL \$200/\$20

KEYS - Keyed Index Sequential Search. Offers complete Multi-Keyed Index Sequential and Direct Access file management. Includes built-in utility functions for 16 or 32 bit arithmetic, string/integer conversions and string compare. Delivered as a relocatable linkable module in Microsoft format for use with FORTRAN-80 or COBOL-80, etc. \$335/\$23

KBASIC - Microsoft Disk Extended BASIC with all KISS facilities, integrated by implementation of nine additional commands in language. Package includes KISS.REL as described above, and a sample mail list program \$585/\$45

To licensed users of Microsoft BASIC-80 (MBASIC) \$435/\$45

XYBASIC Interactive Process Control BASIC - Full disk BASIC features plus unique commands to handle bytes, rotate and shift, and to test and set bits. Available in Integer, Extended and ROMable versions. Integer Disk or Integer ROMable \$295/\$25

Extended Disk or Extended ROMable \$395/\$25

BASIC UTILITY DISK - Consists of: (1) CHUNCH-14 - Compacting utility to reduce the size and increase the speed of programs in Microsoft BASIC 4.51, BASIC-80 and TRS-80 BASIC. (2) DPFUN - Double precision subroutines for computing nineteen transcendental functions including square root, natural log, log base 10, sine, arc sine, hyperbolic sine, hyperbolic arc sine, etc. Furnished in source on diskette and documentation \$50/\$35

STRING-80 - Character string handling plus routines for direct CP/M BIOS calls from FORTRAN and other compatible Microsoft languages. The utility library contains routines that enable programs to chain to a COM file, retrieve command line parameters, and search file directories with full wild card facilities. Supplied as linkable modules in Microsoft format \$95/\$20

STRING-80 source code available separately \$295/NA

THE STRING BIT - FORTRAN character string handling. Routines to find, fill, pack, move, separate, concatenate and compare character strings. This package completely eliminates the problems associated with character string handling in FORTRAN. Supplied with source \$65/\$15

VSORT - Versatile sort/merge system for fixed length records with fixed or variable length fields. VSORT can be used as a stand-alone package or loaded and called as a subroutine from CBASIC-2. When used as a subroutine, VSORT maximizes the use of buffer space by saving the TPA on disk and restoring it on completion of sort. Records may be up to 255 bytes long with a maximum of 5 fields. Upper/lower case translation and numeric fields supported. \$175/\$20

CPM/374X - Has full range of functions to create or re-name an IBM 3741 volume, display directory information and edit the data set contents. Provides full transfer facilities between 3741 volume data sets and CP/M files \$195/\$10

BSTAM - Utility to link one computer to another also equipped with BSTAM. Allows file transfers at full data speed (no conversion to hex), with CRC block control check for very reliable error detection and automatic retry. We use it! It's great! Full wildcard expansion to send *.COM, etc. 9600 baud with wire. 300 baud with phone connection. 300 baud with one. Standard and @ versions can talk to one another \$150/\$5

WHATSIIT? - Interactive data-base system using associative tags to retrieve information by subject. Hashing and random access used for fast response. Requires CBASIC-2 \$175/\$25

SELECTOR III-C2 - Data Base Processor to create and maintain multi-key data bases. Prints formatted sorted reports with numerical summaries or mailing labels. Comes with sample applications, including Sales Activity, Inventory, Payables, Receivables, Check Register, and Client/Patient Appointments, etc. Requires CBASIC-2. Supplied in source \$225/\$20

GLECTOR - General Ledger option to SELECTOR III-C2. Interactive system provides for customized COA. Unique chart of transaction types insure proper double entry bookkeeping. Generates balance sheets, P&L statements and journals. Two year record allows for statement of changes in financial position report. Supplied in source. Requires SELECTOR III-C2, CBASIC-2 and 52K system \$250/\$25

CBS - Configurable Business System is a comprehensive set of programs for defining custom data files and application systems without using a programming language such as BASIC, FORTRAN, etc. Multiple key fields for each data file are supported. Set-up program customizes system to user's CRT and printer. Provides fast and easy interactive data entry and retrieval with transaction processing. Report generator program does complex calculations with stored and derived data, record selection with multiple criteria, and custom formats. Sample inventory and mailing list systems included. No support language required \$295/\$40

Genuine CP/M for Apple II coming soon! Call for details.

Prices reflect distribution on 8" single density diskettes. If a format is requested which requires additional diskettes, a surcharge of \$2 per additional diskette will be added. A surcharge of \$25 will be added for software on CSSN format 8" 300K cartridges.

All Lifeboat programs require CP/M, unless otherwise stated.

all Micropro prices are discounted!

MICROPRO

SUPER-SORT I - Sort, merge, extract utility as absolute executable program or linkable module in Microsoft format. Sorts fixed or variable records with data in binary, BCD, Packed Decimal, EBCDIC, ASCII, floating & fixed point, exponential, field justified, etc. Even variable number of fields per record! \$225/\$25

SUPER-SORT II - Above available as absolute program only \$175/\$25

SUPER-SORT III - As II without SELECT/EXCLUDE \$125/\$25

WORD-STAR - Menu driven visual word processing system for use with standard terminals. Text formatting performed on screen. Facilities for text pagination, page number, justify, center and underscore. User can print one document while simultaneously editing a second. Edit facilities include global search and replace, Read/Write to other text files, block move, etc. Requires CRT terminal with addressable cursor positioning \$445/\$40

WORD-STAR Customization Notes - For sophisticated users who do not have one of the many standard terminal or printer configurations in the distribution version of WORD-STAR NA/\$95

WORD-MASTER Text Editor - In one mode has supersets of CP/M's ED commands including global searching and replacing, forwards and backwards in file in video mode, provides full screen editor for users with serial addressable-cursor terminal \$145/\$25

POLYVIEW/80 - Full screen editor for any CRT with XY cursor positioning. Includes vertical and horizontal scrolling, interactive search and replace, automatic text wrap around for word processing, operations for manipulating blocks of text, and comprehensive 70 page manual \$135/\$15

POLYTEXT/80 - Text formatter for word processing applications. Justifies and paginates source text files. Will generate form letters with custom fields and conditional processing. Superior for Daisy Wheel printers includes variable pitch justification and motion optimization \$85/\$15

TEXTWRITER III - Text formatter to justify and paginate letters and other documents. Special features include insertion of text during execution from other disk files or console, permitting recipe documents to be created from linked fragments on other files. Has facilities for sorted index, table of contents and footnote insertions. Ideal for contracts, manuals, etc. Now compatible with Electric Pencil's prepared files \$125/\$20

Now applications software for Microsofts BASIC interpreter.

PEACHTREE SOFTWARE

GENERAL LEDGER - Records details of all financial transactions. Generates a balance sheet and an income statement. Flexible and adaptable design for both small businesses and firms performing client writeup services. Produces reports as follows: Trial Balance, Transaction Registers, Balance Sheet, Prior Year Comparative Balance Sheet, Income Statement, Prior Year Comparative Income Statement and Department Income Statements. Interactive with other PEACHTREE accounting packages. Supplied in source code for Microsoft BASIC \$990/\$30

ACCOUNTS PAYABLE - Tracks current and aged payables and incorporates a check writing feature. Maintains a complete vendor file with information on purchase orders and discount terms as well as active account status. Produces reports as follows: Open Voucher Report, Accounts Payable Aging Report and Cash Requirements. Provides input to PEACHTREE General Ledger. Supplied in source code for Microsoft BASIC \$990/\$30

ACCOUNTS RECEIVABLE - Generates invoice register and complete monthly statements. Tracks current and aged receivables. Maintains customer file including credit information and account status. The current status of any customer's account is instantly available. Produces reports as follows: Aged Accounts Receivable, Invoice Register, Payment and Adjustment Register and Customer Account Status Report. Provides input to PEACHTREE General Ledger. Supplied in source code for Microsoft BASIC \$990/\$30

Prices and specifications subject to change without notice.

Everything on #13 runs on 64K TRS-80 Model II

- ① **PAYROLL** — Prepares payroll for hourly, salaried and commissioned employees. Generates monthly, quarterly and annual returns. Prepares employee W-2's. Includes tables for federal withholding and FICA as well as withholding for all 50 states plus up to 20 cities from pre-computed or user generated tables. Will print checks, Payroll Register, Monthly Summary and Unemployment Tax Report. Provides input to PEACHTREE General Ledger. Supplied in source code for Microsoft BASIC \$990/\$300
- ① **INVENTORY** — Maintains detailed information on each inventory item including part number, description, unit of measure, vendor and reorder data. Item activity and complete information on current item costs, pricing and sales. Produces reports as follows: Physical Inventory Worksheet, Inventory Price List, Departmental Sales Report, Inventory Status Report, The Reorder Report and the Period-to-Date and Year-to-Date reports. Supplied in source code for Microsoft BASIC \$1190/\$300

GRAHAM-DORIAN SOFTWARE SYSTEMS

- ① **GENERAL LEDGER** — An on-line system; no batching is required. Entries to other GRAHAM-DORIAN accounting packages are automatically posted. User establishes customized C.O.A. Provides transaction register, record of journal entries, trial balances and monthly closings. Keeps 14 month history and provides comparison of current year with previous year. Requires CBASIC-2. Supplied in source \$995/\$355
- ① **ACCOUNTS PAYABLE** — Maintains vendor list and check register. Performs cash flow analysis. Flexible — writes checks to specific vendor for certain invoices or can make partial payments. Automatically posts to GRAHAM-DORIAN General Ledger or runs as stand alone system. Requires CBASIC-2. Supplied in source \$995/\$355
- ① **ACCOUNTS RECEIVABLE** — Creates trial balance reports, prepares statements, ages accounts and records invoices. Provides complete information describing customer payment activity. Receipts can be posted to different ledger accounts. Entries automatically update GRAHAM-DORIAN General Ledger or runs as stand alone system. Requires CBASIC-2. Supplied in source \$995/\$355
- ① **PAYROLL SYSTEM** — Maintains employee master file. Computes payroll withholding for FICA, Federal and State taxes. Prints payroll register, checks, quarterly reports and W-2 forms. Can generate ad hoc reports and employee form letters with mail labels. Requires CBASIC-2. Supplied in source \$590/\$355
- ① **INVENTORY SYSTEM** — Captures stock levels, costs, sources, sales, ages, turnover, markup, etc. Transaction information may be entered for reporting by salesperson type of sale, date of sale, etc. Reports available both for accounting and decision making. Requires CBASIC-2. Supplied in source \$590/\$355
- ① **JOB COSTING** — Designed for general contractors. To be used interactively with other GRAHAM-DORIAN accounting packages for tracking and analyzing expenses. User establishes customized cost categories and job phases. Permits comparison of actual versus estimated costs. Automatically updates GRAHAM-DORIAN General Ledger or runs as stand alone system. Requires CBASIC-2. Supplied in source \$995/\$355
- ① **APARTMENT MANAGEMENT SYSTEM** — Financial management system for receipts and security deposits of apartment projects. Captures data on vacancies, revenues, etc. for annual trend analysis. Daily report shows vacancy notices, vacancies, income lost through vacancies, etc. Requires CBASIC-2. Supplied in source \$590/\$355
- ① **CASH REGISTER** — Maintains files on daily sales. Files data by salesperson and item. Tracks sales, over-rings, refunds, payouts and total net deposits. Requires CBASIC-2. Supplied in source \$590/\$355

- ① **POSTMASTER** — A comprehensive package for mail list maintenance that is completely menu driven. Features include keyed record extraction and label production. A form letter program is included which provides neat letters on single sheet or continuous forms. Compatible with NAD files. Requires CBASIC-2 \$150/\$15

STRUCTURED SYSTEMS GROUP

- ① **GENERAL LEDGER** — Interactive and flexible system providing proof and report outputs. Customization of C.O.A. created interactively. Multiple browser accounting centers. Extensive checking performed at data entry for proof, C.O.A. correctness, etc. Journal entries may be batched prior to posting. Closing procedure automatically backs up input files. Now includes Statement of Changes in Financial Position. Requires CBASIC-2 \$1250/\$255
- ① **ACCOUNTS RECEIVABLE** — Open item system with output for internal aged reports and customer-oriented statement and billing purposes. On-Line Enquiry permits information for Customer Service and Credit departments. Interface to General Ledger provided if both systems used. Requires CBASIC-2 \$1250/\$255
- ① **ACCOUNTS PAYABLE** — Provides aged statements of accounts by vendor with check writing for selected invoices. Can be used alone or with General Ledger and/or with NAD. Requires CBASIC-2 \$1250/\$255
- ① **PAYROLL** — Flexible payroll system handles weekly, bi-weekly, semi-monthly and monthly payroll periods. Tips, bonuses, re-imbursements, advances, sick pay, vacation pay, and compensation time are all part of the payroll records. Prints government required periodic reports and will post to multiple SSG General Ledger accounts. Requires CBASIC-2 and 54K of memory \$1250/\$255
- ① **INVENTORY CONTROL SYSTEM** — Performs control functions of adding and deleting stock items, adding new items and deleting old items. Tracks quantity of items on hand, on order and back-ordered. Optional hard copy audit trail is available. Reports include Master Item List, Stock Activity, Stock Valuation and Re-order List. Requires CBASIC-2 \$1250/\$255
- ① **ANALYST** — Customized data entry and reporting system. User specifies up to 75 data items per record. Interactive data entry, retrieval, and update facility makes information management easy. Sophisticated report generator provides customized reports using selected records with multiple level break-points for summarization. Requires a disk sort utility such as QSORT, SUPER-SORT or VSORT and CBASIC-2 \$250/\$15
- ① **LETTERRIGHT** — Program to create, edit and type letters or other documents. Has facilities to enter, display, delete and move text, with good video screen presentation. Designed to integrate with NAD for form letter mailings. Requires CBASIC-2 \$200/\$25
- ① **NAD Name and Address selection system** — Interactive mail list creation and maintenance program with output as full reports with reference data or restricted information for mail labels. Transfer system for extraction and transfer of selected records to create new files. Requires CBASIC-2 \$100/\$20
- ① **QSORT** — Fast sort/merge program for files with fixed record length, variable field length information. Up to five ascending or descending keys. Full back-up of input files created \$100/\$20

CONDIMENTS

- ① **HEAD CLEANING DISKETTE** — Cleans the drive Read/Write head in 30 seconds. Diskette absorbs loose oxide particles, fingerprints, and other foreign particles that might hinder the performance of the drive head. Lasts at least 3 months with daily use. Specify 5" or 8".
- Single sided \$20 each/\$55 for 3
Double sided \$25 each/\$65 for 3
- ① **FLIPPY DISK KIT** — Template and instructions to modify single sided 5 1/4" diskettes for use of second side in single sided drives \$12.50
- ① **FLOPPY SAVER** — Protection for center holes of 5" and 8" floppy disks. Only 1 needed per diskette. Kit contains centering post, pressure tool and tough 7 mil mylar reinforcing rings for 25 diskettes.
- 5", Kit \$14.95
5", Rings only \$7.95
8", Kit \$16.95
8", Rings only \$8.95
- ① **PASCAL USER MANUAL AND REPORT** — By Jensen and Wirth. The standard textbook on the language. Recommended for use by Pascal/Z, Pascal/M and Pascal/MT users \$10
- ① **THE C PROGRAMMING LANGUAGE** — By Kernighan and Ritchie. The standard textbook on the language. Recommended for use by BDS C, tiny C, and Whitesmiths C users \$12
- ① **STRUCTURED MICROPROCESSOR PROGRAMMING** — By the authors of SMAL/80. Covers structured programming, the 8080/8085 instruction set and the SMAL/80 language \$20
- ① **ACCOUNTS PAYABLE & ACCOUNTS RECEIVABLE** — CBASIC — By Osborne/McGraw-Hill \$20
- ① **GENERAL LEDGER** — CBASIC — By Osborne/McGraw-Hill \$20
- ① **LIFEBOT DISK COPYING SERVICE** — Transfer data or programs from one media format to another at a moderate cost from \$25



Hearty Appetite.

*CP/M and MP/M are trademarks of Digital Research. Z80 is a trademark of Zilog, Inc. UNIX is a trademark of Bell Laboratories. WHATSIT? is a trademark of Computer Hardware. Electric Pencil is a trademark of Michael Shrayser Software. TRS-80 is a trademark of Tandy Corp. Pascal/M is a trademark of Sorcim.

†Recommended system configuration consists of 48K CP/M, 2 full size disk drives, 24 x 80 CRT and 132 column printer.

① Modified version available for use with CP/M as implemented on Heath and TRS-80 Model I computers.

① User license agreement for this product must be signed and returned to Lifeboat Associates before shipment may be made.

① This product Includes/Excludes the language manual recommended in Condiments.

Ordering Information

MEDIA FORMAT ORDERING CODES
When ordering, please specify format code.

Computer system	Format Code	Computer system	Format Code
Altair 8800 Disk	See MITS 2800	Processor Technology Helios II	R5
Altos	A1*	RAIR Single Density	RE
Apple + Microsoft SoftCard	RG	RAIR Double Density	RO
Blackhawk Single Density	R2	Research Machines 8"	A1
Blackhawk Micropolis Mod II	Q2	Research Machines 5 1/4"	RH
CDS Versatile 3B	Q1	REX	Q3
CDS Versatile 4	Q2	SD Systems 8"	A1
COMFAL-80	Q2	SD Systems 5 1/4"	A4*
Cromemco System 3	A1*	Sorcerer	See Exidy Sorcerer
Cromemco 220	R6	Spacebyte	A1
CSDN BACKUP (tape)	T1	Superbrain	See Interlec
Delta	A1*	Tarbell	A1*
Digit-Log Microterm II	R0	TEI 5 1/4"	A1*
Digit-Log Microsystems	A1*	TEI 8"	A1*
Discus	See Morrow Discus	Thinkertoy	See Morrow Discus
Dynabyte DB8/2	R1	TRS-80 Model I	R2
Dynabyte DB8/4	A1*	TRS-80 Model I + Omikron 5 1/4"	RM
Edixy Sorcerer + Lifeboat CP/M	Q2	TRS-80 Model I + Omikron 8"	A1
Edixy Sorcerer + Exidy CP/M	Q4	TRS-80 Model I + Shuffebled 8"	A1
Heath HB + H17/H17	Q4	TRS-80 Model II	A1*
Heath 99 + Lifeboat CP/M	P4	VDP-42/42/44/80	See IMSAI
Heath 99 + Magnolia CP/M	P7	Vector MZ	Q2
Helios II	See Processor Technology	Versatile	See CDS Versatile
Horizon	See North Star	Vista V80 5 1/4" Single Density	P5
ICOM 2411 Micro Floppy	R3	Vista V200 5 1/4" Double Density	P6
ICOM 3712	A1	Zenith 289 Lifeboat CP/M	P4
ICOM 3812	A1*	Zenith 289 Magnolia CP/M	P7
ICOM 4511 5440 Cartridge CP/M 1.4 D1	D2		
ICOM 4511 5440 Cartridge CP/M 2.2 D2	D2		
IMS 8000	RA		
IMS 8000	A1*		
IMSAI VDP-40	R4*		
IMSAI VDP-42	R4*		
IMSAI VDP-44	R5*		
IMSAI VDP-80	A1*		
Intel MCS Single Density	A1		
Interlec Super-Brain DOS 0.1	R7		
Interlec Super-Brain DOS 0.6-2X	RK		
Interlec Super-Brain DOS 3.5X	RK		
Krontron PSI-80	RF		
Meca	P6		
Micromation (Except TRS-80 below)	A1*		
Micropolis Mod I	Q1		
Micropolis Mod II	Q2		
MITS 3200/3202	B1		
Morrow Discus	A1*		
Modex	RC		
MSD 5 1/4"	RC		
North Star Single Density	P1		
North Star Double/Quad	P2		
Nytec Single Density	Q3		
Nytec Micropolis Mod. II	Q2		
Ohio Scientific	A3		
Pertec PCC 3000	A1*		

Prices F.O.B. New York.
Shipping, handling and C.O.D. charges extra.

Minimum cost applicable against price of subsequent software purchase.

The sale of each proprietary software package conveys a license for use on one system only.



COMING NEXT MONTH

Get behind the controls of a Boeing 747 — from takeoff to landing — in a Basic program that realistically simulates an actual flight. Also some down-to-earth tips on the physical necessities of making a place for your first home micro, and a clever method of interfacing a daisy-wheel printer with an Apple computer — for those who want to use their Apple for word processing.

BUSINESS SOFTWARE REVIEW

By Carl Heintz

This month we focus on a unique and outstanding piece of software—Bookkeeper, distributed through MicroSource, the software arm of MicroAge in Tempe, AZ.

Bookkeeper was designed by a CPA for CPAs to use in small and medium-sized accounting firms. It performs automated financial statement and write-up functions programmed to run on a North Star Horizon computer. Programs are flexible, and financial statements can be tailored to satisfy client requirements.

Knowledge of computer programming is not required, in fact the most unsophisticated user can tackle it. (Any manual that contains instruction on how to plug in the computer can't be too difficult.) Nothing is left to the operator's imagination or apprehension. The manual has dividers, flowcharts, sample reports and appendices which explain the operating system.

WHAT DO YOU GET?

Bookkeeper gives the accountant the following reports:

- Chart of accounts
- Quarterly payroll tax worksheet
- Journal listings
- Employee lists
- Financial statements
- W-2 forms
- Payroll journal

HOW DOES IT WORK?

Bookkeeper consists of two integrated programs: payroll and general ledger. In payroll, detailed records are kept of each employee and his earnings. Entry of this information is not integrated with the entries in the general ledger section; the two do not automatically interact. This keeps it simple. Even so, the system saves a considerable amount of time over most systems where payroll information must be entered into a separate payroll program.

Since payroll processing is not necessary for each client, it is offered as an option. Another point: it is an "after the fact" system—it will not prepare checks or compute deductions. It simply records what has been disbursed. This is not a disadvantage. Ordinarily, accountants don't write payroll checks; they record them in the journal after they have been written. The manual refers to eight "modules" which comprise:

- Initializing disks or making backups
- Journal entry
- Payroll processing procedures
- Preparing general ledgers
- Creating or editing chart of accounts
- Setting up financial statements
- Preparing financial statements
- Disk utilities

As to statistics, capacity depends on the disks to be used:

	Disk Density	
	Single	Double
Number of clients per disk	1	1
Number of employees	53	107
Number of accounts	256	511
Number of transactions	1000	2000

Although this data is built into the system as shipped, instructions are given on how to change the system to accommodate larger accounting charts. Of course, the issue is how to fit two pounds into a one pound bag. The trade off is between the number of transactions that can be accommodated, and the chart of accounts. There is

no one-for-one exchange, since an accounting chart takes a lot more space than a transaction.

Account numbers are very flexible. There can be eight digits to each account number, consisting of a two-digit prefix (for departments or subsidiaries), a four-digit "core" number, and a two-digit "suffix" or sub-account number.

The core of any accounting system is the data entry process. The entry sequence for Bookkeeper is:

1. Entry of date MM DD YY
2. Entry of six space alphanumeric reference, such as a check number
3. Entry of a 20 position alphanumeric description
4. Entry of the account number affected
5. Entry of amount

The operator specifies a credit with a "-" before the amount. Cents are entered without a ".", which is somewhat convenient since most accountants generally use a "10-key" pad.

One disadvantage with Bookkeeper's data entry sequence is the lack of special functions, such as the repeat function. In some systems, there is a feature that allows an operator to repeat the prior field ("default" to it). This saves quite a bit of operator time. Another missing special function is the "cancel" key. If an operator is in the middle of entering a transaction, a "void" function is needed. Bookkeeper has none. The only way to correct data or cancel a transaction is to enter an offsetting entry.

The system utilizes different journals. There are seven allowed (two more can be set by the user, if desired):

1. General journal
2. Sales journal
3. Receipts journal
4. Purchases journal
5. Disbursements (checks)
6. Payroll (to record summary totals from the payroll system)
7. Adjusting journal

The adjusting journal represents a convenient way of making period adjustments to a general ledger. In Bookkeeper, this is possible without affecting current activity balances; however, the journal entry sequence is not as flexible.

Once journal entries have been made, the system can print and update the general ledger of a preliminary general ledger. The preliminary general ledger is a preview of how the accounts will look after they have been posted.

Bookkeeper does not have a trial balance as part of its output. A trial balance, which lists all the accounts and their beginning balances, a summary of the debits and credits and their ending balances, is useful. It's quicker to print out than the general ledger and sometimes, since none of the detail is present, easier to scan for errors. Bookkeeper presents a full general ledger instead—in a sense, it is a trial balance. The accountant has all the details in front of him so additional entries may be made.

It is unfortunate that none of the general ledger packages commercially available have the ability to generate "pro forma" balance sheets and income statements before closing. This feature allows an accountant to see his statements before setting the month's activity "in concrete." In all available micro packages, one must go through a "closing" where all the current activity is erased before a statement can be generated.

An accountant appreciates the painstaking efforts which insure that the general ledger stays in balance. Make an error and the system will beep. If an attempt is made to post an out of balance entry, bells and whistles go off. Each journal must balance. There are, however, ways to circumvent the system, when—on rare occasions—an imbalanced entry might be a necessity.

FINANCIALS TO SUIT

A flexible feature of Bookkeeper is the way financial statements are generated. Financials are not dependent upon the chart of accounts. Instead, for each client, a separate financial statement "header" file is set up. This file contains a complete description of the financial statement, including the accountant's opinion letter. There are little codes to instruct the system about including accounts as subtotals, etc.

Various options are available: underlining, flexible column formatting, percent calculations and more to satisfy client statement requirements. □



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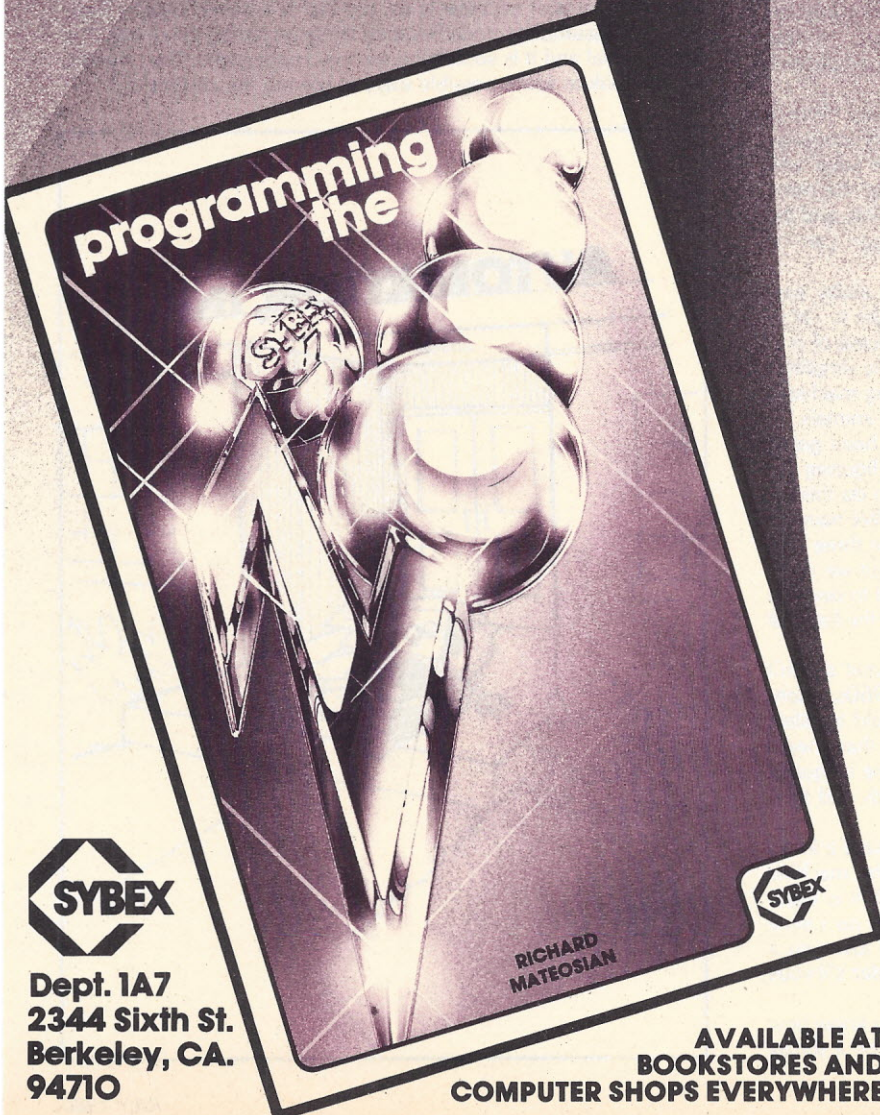
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THE MIND REVOLUTION

By Merl Miller

Would you like to have a computer that could be programmed in a nice logical language like English? Sounds great doesn't it? The problem is there is no such language. All languages, human and computer, have evolved through use rather than logic. Human languages are characteristically illogical. For the next three months, we'll look at languages, particularly how computer concepts might be used to develop a truly natural language. This new language would be understandable by both humans and computers.

Spoken human language is an imprecise series of somewhat dissimilar grunts. At some point in every language, the grunTERS decided they needed to record their great thoughts. They would do this by assigning scribbles to the grunts. This developed differently in each culture, but the pattern was essentially the same (grunt-grunt-scribble-enlightenment). Computer languages have developed in exactly the opposite way. The written language came first; the spoken language is still being developed. The big problem arises when the computer tries to emulate the human voice. It sounds "unnatural." (If that sounds unnatural, imagine how our series of grunts and exhalations sound to a canary.)

Perhaps Lytton Strachey said it best. In his 1948 essay "Words and Poetry" he said: "Perhaps of all the creations of man, language is the most astonishing." He went on to say: "Those small articulated sounds, that seem so simple and definite, turn out, the more one examines them, to be the receptacles of subtle mystery and the dispensers of unanticipated power." Ah yes, language can be powerful but it can also be confusing.

Language is not itself a sign of intelligence, nor an ability possessed only by human beings. English has been taught to chimpanzees and can be taught to machines. It is a simple case of programming in both instances. To accomplish this, a highly simplified artificial language has been developed. Actually teaching machines our language shows a lot more promise than teaching animals.

Research and teaching language to a computer has been going on for years. The primary emphasis has been aimed at figuring out how to make a computer understand our language. To do this we need to understand the language ourselves. We don't. We have no idea what happens to an oral signal after it wiggles the three little bones in our ear. We know what it does physically, but we don't know why it means something to our brain. It is difficult to devise a machine that emulates this process when we don't have the foggiest idea how the process works.

Before we look at what might work, let's look at what doesn't work, starting with automatic translators. In the early 1960s, scientists and linguists attempted to build machines that could translate human languages. Initial work focused on syntax rather than meaning because the linguist felt that transformation from one language to another could be accomplished by identifying words and then checking the meaning.

This is fine if you have a sense of humor and only want a loose translation. Before this kind of translation is possible, the machine must understand both the text and the context in which it is used. For instance, the Japanese phrase: "Watashi wa anato no i shite imus" roughly means "I love you much," which is "I love you a lot." Or the French phrase or initials "RSVP," "repondez s'il vous plait" translates as "Answer, if it you pleases."

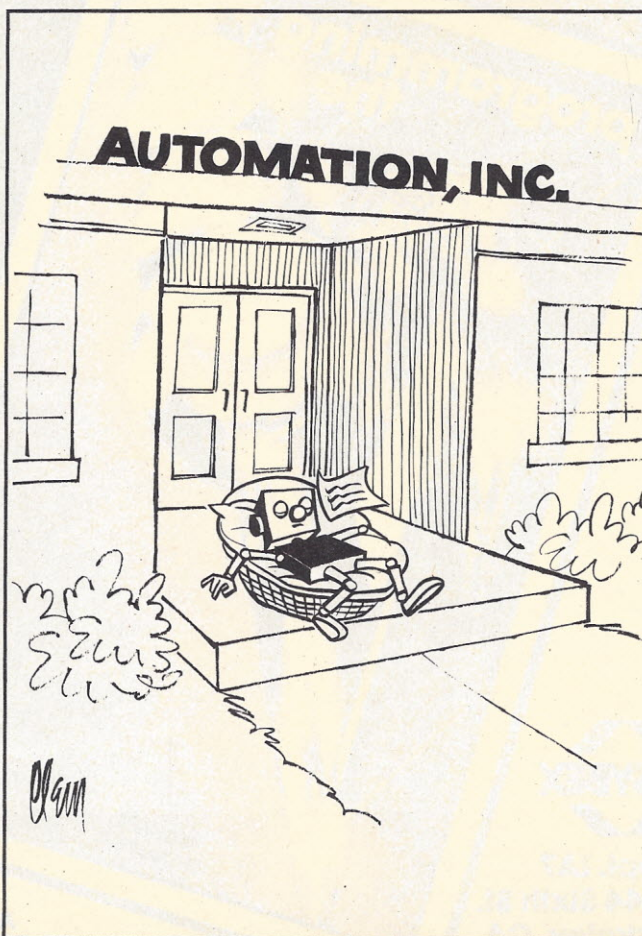
If you have ever tried to learn a foreign language, you know how important understanding is. Most languages are taught on a syntax

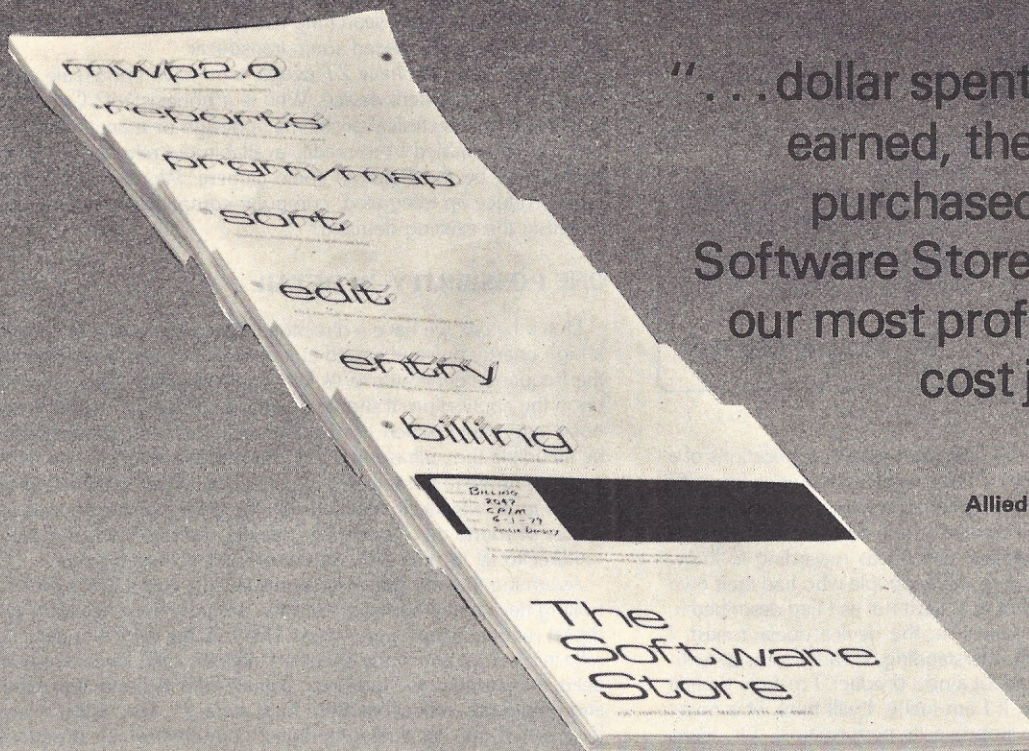
basis rather than an understanding basis. For example, many people have taken a foreign language in high school or college, only to discover it doesn't help them when they go to that country. On the other hand, most GIs stationed in foreign countries learn enough useful phrases to get around. Quite often they will know a phrase and have no idea what the individual words mean. You can do this too; a little experiment will prove it. The experiment is beyond the capabilities of any computer but it is easily within your grasp. What you need is a copy of a computer magazine in a foreign language and an open mind. One foreign language magazine is "Ordinateur-Lib." You can get a copy of it by writing to Bureau d'Affaires, 8042, Rue St-Hubert, Montreal, Quebec, Canada H2R 2P3. They will want \$2.50, but it's worth it. The magazine, totally in French, is very good.

English is the standard language of technology because our nation has been in the forefront of it. The original English word is used because there is no direct translation of such words as flip-flop or RAM. All you need to do to read a foreign language magazine is pick out the words you know, then try to figure out what the rest of the article is supposed to say. Try it—you'll be surprised at how quickly you can pick it up. This is a classic example of learning by understanding rather than syntax—exactly what we must teach a machine to do.

Let's go on with another idea that didn't work—information retrieval. The sheer bulk of this approach makes it impractical. The basic idea is to ask the machine a question; it gives possible answers until it responds correctly. By doing a search of its data and matching these to your requests, the machine might tell you roughly what you hope to find. An information retrieval system makes no decisions; consequently, it doesn't understand. This is quite different from an intelligent question and answer machine that amends the data with new input.

In previous columns, we have discussed the idea of questioning the machine and expecting intelligent answers, one of the basic tenets of artificial intelligence. This is because we often feel that if we get an intelligent response to a question, the machine must understand what we said. This isn't necessarily so, but that is another subject. However, this assumption underlies such things as testing in schools. It is fundamental and it is something we must understand. Next month, we will look at some possible ways of solving the problem. □





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The *application utilities* are the basic building blocks for application program systems. Almost every application can be made of a key-to-disk data entry segment, a file edit segment, a sort/merge segment, a record selection segment and a report & file update segment. These functions are carried out by the ENTRY, EDIT, SORT, SELECT and REPORTS systems, respectively. Application utilities consist of two programs: one for interactive task definition and the other for task execution. Once defined, a task may be executed any number of times or easily revised.

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of the flexible and interactive design of the task definition programs, previously defined systems can be easily revised to meet changing needs.

The *systems* are complete packages for a specific application. Systems are fabricated from application utilities together with application specific programs. For example, our Accounts Receivable System utilizes the ENTRY, EDIT, SORT, SELECT and MWP systems along with six special billing system programs.

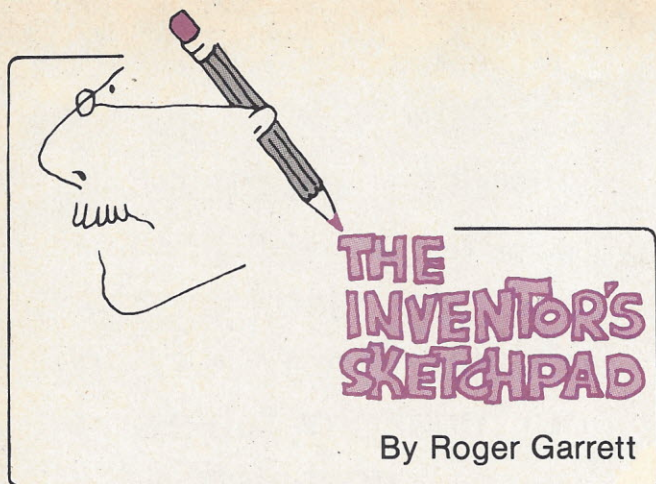
The MWP system is a complete word processing system with flexible user defined "name & address" files. The "name and address" information and date can be inserted throughout a document. The documents might be reports, manuals, mailing labels, letters or legal documents.

The *system utilities* include programming tools such as the Program Map BASIC cross reference program along with general utilities such as the Disk Fix file recovery program, the Disk Copy (1D & 2D) diskette copy program, the TX-RX file transfer and media conversion programs and the CATALOG diskette library index program.

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In a previous issue, my column described several applications of a device called a sonic transducer. I have received inquiries from 27 individuals requesting more information. Each had a new application for it. The fact that no one wanted to use it for the application I described was at first disheartening. But it was rewarding to know that I had introduced a device to so many people who had their own uses for it but had never heard of it; at least not as I had described it.

That's where the problem comes in: the device doesn't exist. I apologize profusely for the misunderstanding. I read dozens of technical magazines; when I read about a new product, I make a mental note of it for further reference. If I am lucky, I will think of a novel application or modification to improve its performance. Or, ideas will merge in my mind to form the basis for an entirely new device. Often, a novel idea will form with no clear basis on existing products or concepts.

In the case of the sonic transducer, as best as I can reconstruct it, I developed the application based on the sonic positioning method

employed by the Polaroid sonic camera and a vague recollection of having read about a DIP-based sonic transducer. Polaroid clearly uses a sonic device in its camera. Unfortunately, it is apparently comprised of discrete components, not the single integrated device I described. Subsequent searching has revealed the embarrassing fact that there is no DIP-based sonic transducer.

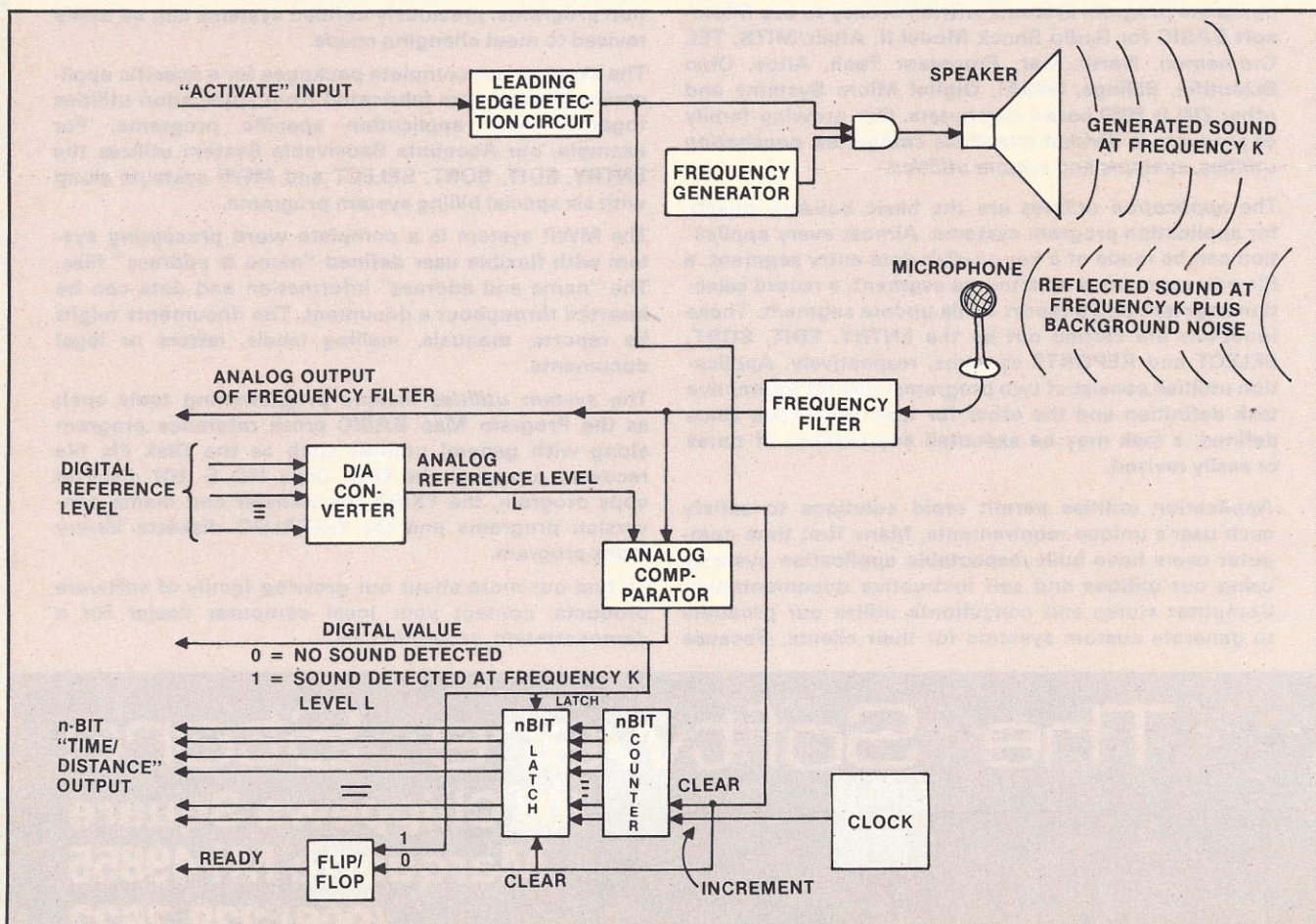
But wait. Here we have 27 people who have immediate applications for a nonexistent device. Why is it nonexistent? Certainly not because of any technical problems in design or manufacture. It can easily be assembled from readily-available discrete components, as exemplified by the Polaroid sonic camera. Won't some manufacturer produce an integrated, computer-compatible sonic transducer to satisfy the existing demand?

ONE POSSIBILITY--IN DETAIL

Down below, we have a directional speaker capable of outputting a high energy pulse of sound at a discrete frequency determined by the frequency generator to its left. The frequency used will depend upon the application. It should be outside of the normal background noise range and, when used with people present, should probably be inaudible (i.e., ultrasonic). The microphone detecting the reflected sound is tuned to the selected frequency by a filter, enabling all other sound to be effectively blocked out; the device only responds to the pulses of sound that it generates. Ideally, the microphone should be unidirectional to only pick up the primary reflected pulse.

Assuming that our device is connected to a computer or other controlling device, the computer sets the device's reference level via the digital reference level input lines. This tells the device to detect only reflected sound above the specified intensity (dB) level. This can be used, for example, to "tune out" signals reflected from soft materials and only detect reflections from hard surfaces. The digital reference level is fed into an analog-to-digital converter which produces an analog reference level that is fed into an analog comparator.

The controlling computer then sends a binary 0 followed by a binary 1 over the "activate" input line. The device is activated when it detects the leading edge transition from logic 0 to logic 1. When this is detected, the counter and latch (at the bottom of the figure) are



cleared, a short sonic pulse is generated by the speaker, and the counter begins incrementing at a rate determined by the clock speed.

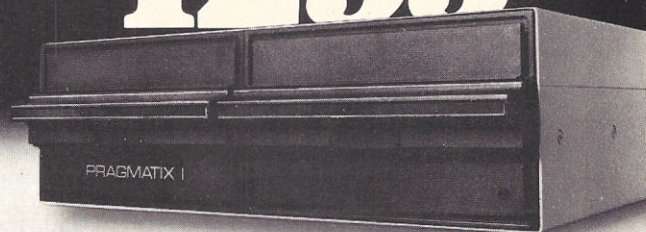
When the sonic pulse encounters an object, part of the sound energy is reflected back and detected by the microphone/frequency filter, whose output is an analog measurement of the detected sound's intensity. When the analog comparator detects that the intensity of the reflected sound exceeds the intensity reference level *L*, the current count in the counter is latched into the latch and the "ready" line is set high.

From the controlling computer's standpoint, it sets a reference level, activates the device, and waits for the "ready" line to go high. It then reads the digital value from the *n*-bit output lines. This corresponds to the amount of time it took for the sonic pulse to travel from the speaker to the reflecting object and back to the microphone. Since the speed of sound is relatively constant and the clock rate is known, this accurately represents the distance between the sonic transducer and the reflecting object.

This device is not unique. This method is commonly used for sonar technology and to scan the beating valves of a human heart (an echo-cardiogram). What is unique is that no one has put it together in a neat computer compatible package for those 27 unique applications that our readers came up with. Until someone does, each company will have to put its own unit together from discrete components. (A speaker/microphone/frequency generator device called the Ultra Sonic Transducer is available from Delta Electronics, 176 Second Ave., Waltham, MA 02154. It's not the complete device described here, but it's a good starting point.) □

Do you have an innovative concept or novel solution to some computer-related problem? Or a challenging problem in search of solution? Then write me care of Interface Age. If your idea is deemed suitable by our panel of experts (me), we will share it with the world through this column. If your problem is interesting and applicable to our readers, that same panel will try to solve it and report the results here. Address all correspondence to Inventor's Sketchpad, c/o Interface Age Magazine, P.O. Box 1234, Cerritos, CA 90701.

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Parts Inventory Control

By Chuck Atkinson

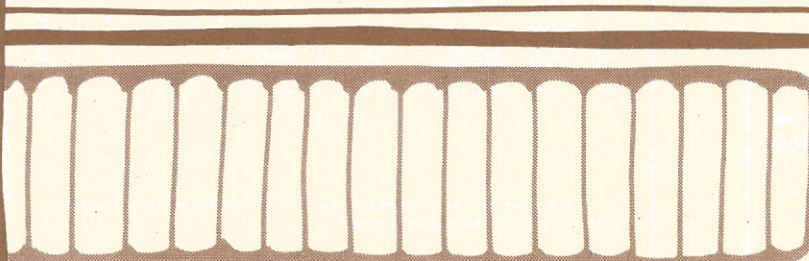


Most small retail businesses are involved with buying and selling small items. The frequency with which this is done is salesmanship. The efficiency with which this is done is inventory control. Inventory control also reduces the number of sales lost as a result of an item being out of stock. Good control reduces the amount of money required to have a complete inventory to satisfy your customer needs. It is also necessary to know the sales history for each item to order effectively for future demand. Lost sales are of interest to prevent their recurrence. Parts must be correctly priced when received in this day of startling inflation and price increases. They must also be added to the inventory upon receipt. A complete listing of the part numbers and quantities on hand is necessary to make a physical check of the inventory periodically. And wouldn't it be wonderful if the listing could be in the exact order that the parts are located in the store? Other useful items are: A complete list of the inventory in numerical order, another list in alphabetical order and a list of suppliers names, addresses, phone numbers and their products. These lists are used for quick reference by sales people, the purchasing agent and customers. The business management will also use the above for planning and analysis.

There are systems in use now that are very effective and have worked for years. Most use card files and require manual posting of information and manipulation of the cards. And, unfortunately, there are many small businesses that operate without any system for inventory control. They are under staffed or under capitalized or both.

How much money do they lose each year by not knowing exactly what is going on? How much money is out of reach in overstocked items? How many sales are being lost because of erratic ordering practices and out of stock items? How many items are 'walking out the door'? and finally, is it all worthwhile; is the business making a satisfactory profit in the owner's estimation?

The microcomputer has made it possible to have all this information and to be very effective in operating a small business without having to increase expenses or personnel. Sound like magic? Well, it looks like it, too, when you first see it in operation. The parts inventory control is actually done by two programs. The first is used to create the parts file and to maintain it. Think of it as taking all your cards from the card file and typing them onto small, record player-like disks. The second is used in the daily operation of the parts business.



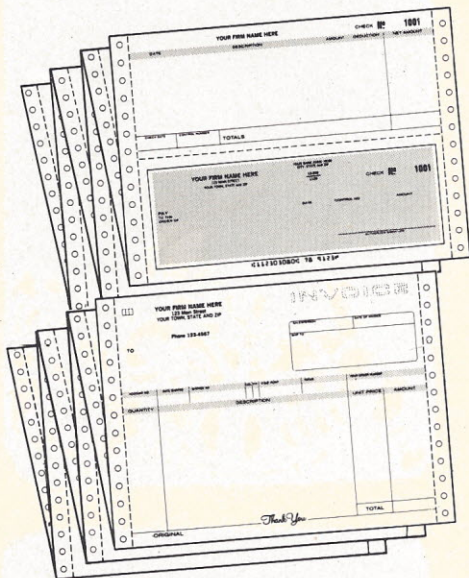


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1	3282	RECORDS	0	0	C78	-	0	0	0	0	0	0	0
2	001995	WASHER (N/A)	0.15	11	A214	0	0	0	0	0	0	0	36
3	004270	NEEDLE VAL N/A	2	2	N2166	0	0	0	0	0	0	0	36
4	004419	STARTER ROPE	8.05	1	L13	0	0	0	1	1	0	0	36
5	021195	NUT (N/A)	0.12	4	A151	0	0	0	0	0	0	0	36
6	041110	307565	0	0	A53	0	0	0	0	0	0	0	36
7	041188	316520	0	0	A19	0	0	0	0	0	0	0	36
8	041195	301740	0	0	A87	0	0	0	0	0	0	0	36
9	041205	314367	0	0	A145	0	0	0	0	0	0	0	36
10	042137	ROPE	12.55	4	A653	0	0	0	0	0	0	0	36
11	004372	SEAL	0.15	4	A167	0	0	0	0	0	0	0	36
12	103867	WASHER	0.22	1	A429	0	0	0	0	0	0	0	36
13	112840	BEARING	0.77	3	A426	0	0	0	2	4	0	0	36
14	120052	WASHER	0.22	4	A85	0	0	0	0	0	0	0	36
15	120110	CLAMP RING	0.15	2	A170	0	0	0	1	2	0	0	36
16	120177	LOCKWASHER	0.15	2	H63	0	0	0	2	4	0	0	36
17	120395	KEY	0.32	4	A32	0	0	0	2	6	0	0	36
18	120783	TAG	0.15	3	A102	0	0	0	0	0	0	0	36
19	121025	WASHER	0.15	3	A465	0	0	0	0	0	0	0	36
20	121192	SPACER	0.68	4	N2222	0	0	0	0	0	0	0	36
21	121200	SPACER	0.84	11	A20	0	0	0	2	12	0	0	36
22	121267	121895	0	0	N1033	0	0	0	0	0	0	0	36
23	121268	BUSHING	0.4	3	A210	0	0	0	0	0	0	0	36
24	121269	LEVER	3.5	1	N2227	0	0	0	0	0	0	0	36
25	121276	DETENT	0.51	1	A351	0	0	0	0	0	0	0	36
26	121282	SCREW	0.6	2	A352	0	0	0	2	4	0	0	36
27	121285	SCREW	0.22	2	A57	0	0	0	0	0	0	0	36
28	121350	BRACKET	0.49	1	N2212	0	0	0	1	1	0	0	36
29	121670	BACK PLATE	12.4	1	G12	0	0	0	0	0	0	0	36
30	121671	FRONT PLATE	10.1	1	A212	0	0	0	1	1	0	0	36
31	121674	STOP NUT	0.54	2	A384	0	0	0	1	2	0	0	36
32	121687	FITTING	1.4	1	A331	0	0	0	0	0	0	0	36
33	121761	CLIP	1.2	2	M510	0	0	0	1	1	0	0	36
34	121836	BUSHING	1.55	4	A353	0	0	0	0	0	0	0	36
35	121837	SEAL	0.15	4	A352	0	0	0	2	4	0	0	36
36	121838	PIN	1.1	2	A353	0	0	0	0	0	0	0	36
37	121839	BUSHING	0.98	2	A379	0	0	0	1	2	0	0	36
38	121840	PIN	0.86	2	A220	0	0	0	0	0	0	0	36
39	121891	ELBOW	1.2	1	A331	0	0	0	0	0	0	0	36
40	121895	ROLLER	1.55	4	N1033	0	0	0	0	0	0	0	36
41	121952	SUPPORT PLATE	7.05	1	I41	0	0	0	1	1	0	0	36
42	121955	POST	11.95	1	I41	0	0	0	1	1	0	0	36
43	121956	BUSHING	1.95	1	I25	0	0	0	1	1	0	0	36
44	121957	WASHER	0.55	4	A90	0	0	0	1	1	0	0	36
45	121985	O RING	1.75	2	N2111	0	0	0	1	2	0	0	36
46	121986	O RING	1.7	2	A360	0	0	0	1	1	0	0	36
47	122028	ROD	1.4	3	N2147	0	0	0	0	0	0	0	36
48	122030	WASHER	2.4	3	A129	0	0	0	0	0	0	0	36
49	122097	SCREW	0.1	1	A297	0	0	0	0	0	0	0	36
50	122098	O-RING	0.78	2	A297	0	0	0	0	0	0	0	36
51	122100	ADAPTOR	7.35	1	M22	0	0	0	0	0	0	0	36
52	122101	O-RING	0.79	1	N2150	0	0	0	0	0	0	0	36
53	122102	PLUNGER	12.1	1	N2150	0	0	0	0	0	0	0	36
54	122103	PACKING SEAL	12.79	1	N2150	0	0	0	1	1	0	0	36
55	122151	319366	0	0	A0	0	0	0	0	0	0	0	36
56	122202	THERMAL COMP	5.4	1	R1	0	0	0	0	0	0	0	36
57	122269	O-RING	1.65	2	N2165	0	0	0	1	2	0	0	36
58	122401	SPACER	0.41	6	A424	0	0	0	1	1	0	0	36
59	122402	ROD	1.6	3	N2219	0	0	0	1	1	0	0	36
60	122406	RUBBER BUSHING	0.35	6	N2114	0	0	0	1	1	0	0	36
61	122478	122480	0	0	N2121	0	0	0	0	0	0	0	36
62	122480	122899	0	1	N2121	0	0	0	0	0	0	0	36
63	122481	SCREW	0.15	2	A476	0	0	0	1	2	0	0	36
64	122493	END CAP	4.45	1	I43	0	0	0	1	1	0	0	36
65	122494	ROD WIPER	0.9	3	A454	0	0	0	0	0	0	0	36
66	122514	RET RING	0.49	2	A413	0	0	0	1	2	0	0	36
67	122515	O-RING	0.51	2	A49	0	0	0	1	2	0	0	36
68	122553	LIGHT BULB	0.87	1	A476	0	0	0	1	1	0	0	36
69	122647	DECAL	0.74	1	A459	0	0	0	0	0	0	0	36
70	122680	SCREW	2.75	1	N2121	0	0	0	1	2	0	0	36
71	122727	SPECIAL TOOL	0	1	A0	0	0	0	0	0	0	0	36
72	122728	SPECIAL TOOL	0	1	A0	0	0	0	0	0	0	0	36
73	122733	SNAP RING	0.44	2	A442	0	0	0	0	0	0	0	36
74	122770	SCREW	0.98	3	M42	0	0	0	1	3	0	0	36
75	122787	BRKT	1.6	1	M318	0	0	0	1	1	0	0	36
76	122790	GSKT	1.7	4	F34	0	0	0	2	4	0	0	36
77	122838	HOSE--50 FT.	17.95	1	A0	0	0	0	1	1	0	0	36
78	123077	SCREW	0.65	4	B17	0	0	0	0	0	0	0	36
79	123195	SPECIAL TOOL	0	1	A0	0	0	0	0	0	0	0	36
80	123196	SPECIAL TOOL	0	0	A0	0	0	0	0	0	0	0	36
81	130167	SCREW	0.22	4	N2134	0	0	0	2	4	0	0	36
82	130450	NUT	0.15	3	A32	0	0	0	0	0	0	0	36
83	130538	SCREW	0.53	2	N2094	0	0	0	0	0	0	0	36
84	130618	SCREW	0.17	10	A191	0	0	0	0	0	0	0	36
85	132124	SCREW	0.15	2	A331	0	0	0	0	0	0	0	36
86	132346	SCREW	0.15	9	A361	0	0	0	0	0	0	0	36
87	132509	SCREW	0.15	3	A170	0	0	0	0	0	0	0	36
88	132679	SCREW	0.24	10	N1002	0	0	0	8	10	0	0	36
89	132691	GLAND	0.57	4	A189	0	0	0	0	0	0	0	36
90	133022	SCREW	0.26	10	N2212	0	0	0	6	12	0	0	36
91	133079	NUT	0.15	2	A432	0	0	0	0	0	0	0	36
92	133452	SCREW	0.15	4	A170	0	0	0	2	4	0	0	36
93	160084	BALL	0.15	3	A50	0	0	0	0	0	0	0	36
94	170912	PACKING	0.3	3	A19	0	0	0	0	0	0	0	36
95	171637	ANODE KIT	21.95	1	I58	0	0	0	1	2	0	0	40
96	171680	TERM BLOCK KIT	20.25	2	H42	0	0	0	0	0	0	0	40
97	171741	172926	0	0	A0	0	0	0	0	0	0	0	36
98	171745	WIRE	0.99	1	A192	0	0	0	0	0	0	0	36
99	171845	STARTER KIT	125	1	E14	0	0	0	0	0	0	0	32
100	171861	PLATE	2.1	1	C56	0	0	0	0	0	0	0	40
101	171878	BATTERY LEAD	0.63	1	A192	0	0	0	0	0	0	0	36
102	171951	TERMINAL	59.4	0	I22	0	0	0	0	0	0	0	36
103	172062	172957	0	0	K81	0	0	0	0	0	0	0	36
104	172123	SW & CABLE	26	2	B 33	0	0	0	1	2	0	0	36
105	172127	OIL SENDER	18.5	1	B 310	0	0	0	1	1	0	0	36
106	172154	VALVE PKG	5.15	2	L42	0	0	0	0	0	0	0	36
107	172157	HEAD END	9.9	1	L68	0	0	0	0	0	0	0	36
108	172161	GSKT PKG	6.8	2	N2103	0	0	0	1	2	0	0	36
109	172189	POWER TILT	229.5	0	B 93	0	0	0	0	0	0	0	32
110	172193	FUSE PANEL	6.95	2	B 83	0	0	0	2	4	0	0	40

Note There are 4000 part numbers on each 5 1/4" double density diskette.
Only 110 are printed here as a sample.

Figure 1. Portion of computer inventory list

CAUTION ! !

CHANGE DISKS IN DRIVE B ONLY WHEN AT THE TABLE OF OPERATIONS
AND BY USING THE SWAP OPTION!

TODAY'S DATE? 1-17-80

TABLE OF OPERATIONS

S = SALES INVOICE	R = RECEIVE SHIPMENT
P = PURCHASE ORDER	A = ANALYSIS REPORT
L = LOST SALE	F = FIND PART NUMBER
SWAP = EXCHANGE DISKS IN DRIVE B	END = END OF RUN

SELECT ACTION FROM TABLE ABOVE

Figure 2. Table of operation

The parts operations program is used to:

- Post daily sales
- Give sales reports
- Write purchase orders automatically
- Post parts received
- Record lost sales
- Search for individual parts status
- Zero sales records each month or year

A portion of the complete inventory list is given in Figure 1. There are about 4,000 individual part numbers on a double density mini diskette. The information maintained for each part includes: part number (P/N), description, list price, quantity on hand, location, vendor (V), manufacturer (MF), minimum stock level, maximum stock level, sales this month (MON), sales for the year to date (YTD) and the per cent discount (%).

S

SALES INVOICE POSTING

QUANTITY ? 0 = NO MORE. 1

PART NUMBER ? 1995

QUANTITY ? 0 = NO MORE. 2

PART NUMBER ? 21195

QUANTITY ? 0 = NO MORE. 1

PART NUMBER ? 4372

QUANTITY ? 0 = NO MORE. 4

PART NUMBER ? 121282

QUANTITY ? 0 = NO MORE. 0

SALES REPORT FOR 1-17-80

QUAN	PART NUMBER	DESCRIPTION	PRICE	TOTAL
1	001995	WASHER (N/A)	\$0.15	\$0.15
2	021195	NUT (N/A)	\$0.12	\$0.24
1	004372	PIN	\$0.15	\$0.15
4	121282	SCREW	\$0.60	\$2.40
TOTAL				\$2.94
TAX				\$0.12
TOTAL				\$3.06

Figure 3. Daily sales receipts

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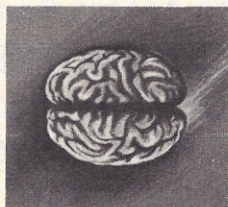
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The program signs on with a Caution ! reminder about changing disks (there is no limit to the number of data disks that may be used). The date is entered and then the table of operations is displayed (Figure 2). After this, the operation is simply a matter of selecting the desired operation and hitting RETURN.

At the end of the day, take the sales receipts and post them after entering S (Figure 3). This example shows the entering of sales of 1 #1995, 2 #21195, 1 #4372 and 4 #121282. The part numbers are automatically in the file and the quantity on hand reduced by the amount sold. The sales report follows, giving a listing of the sales for that day and the total income and automatically computes the sales tax. The grand total should equal the cash for the day, less returns.

PURCHASE ORDER # 11780		TO:	FROM:					
OMC CORP 111 MOTOR ST ZOOM, MICH 65234			SAILING CENTER ROUTE 5 BOX 279-S FORT WORTH, TEXAS 76126					
QUANTITY	PART NUMBER	DESCRIPTION	PRICE	DISC	TOTAL	LOC	OH	MAX
3	112840	BEARING	0.77	36	1.4784	A426	1	4
3	121282	SCREW	0.6	36	1.152	A352	1	4
18	172366	2+4 COND	2.25	36	25.92	Z1	6	24
THERE ARE 18 OF P/N 172366 ALREADY ON ORDER.								
4	304070	SCREW	0.15	36	0.384	A264	8	12
THERE ARE 4 OF P/N 304070 ALREADY ON ORDER.								
4	308719	KNOB	0.19	36	0.4864	A397	0	4
THERE ARE 4 OF P/N 308719 ALREADY ON ORDER.								
4	310585	O-RING	0.15	36	0.384	A128	0	4
THERE ARE 4 OF P/N 310585 ALREADY ON ORDER.								
2	312771	HOSE	6.45	36	8.256	C36	2	4
THERE ARE 2 OF P/N 312771 ALREADY ON ORDER.								
TOTAL ORDER IS			\$38.06					

Figure 4. Automatic purchase order

Possibly the greatest time and money saver is the ability of the program to rapidly scan the quantity on hand for all the parts and to automatically print a purchase order to a single vendor for the parts that are below the minimum stock level. The mailing address is even included when retrieved from the vendor file. A note is printed if the parts have already been ordered to prevent duplicate orders. By hitting one key, representing the vendor, the purchase order is created, typed, addressed, and totaled. How long does it take now, with a card file?

When a parts shipment arrives, the parts received are posted in a manner similar to the parts sales. A summary is then printed out for reference (Figure 5). Price changes should be entered at this time using the Parts File Maintenance program.

PARTS RECEIVED 1-17-80				
QUAN	PART NUMBER	DESCRIPTION	PRICE	TOTAL
3	112840	BEARING	\$0.77	\$2.31
3	121282	SCREW	\$0.60	\$1.80
18	172366	2+4 COND	\$2.25	\$40.50
8	304070	SCREW	\$0.15	\$1.20
4	308719	KNOB	\$0.19	\$0.76
4	310585	O-RING	\$0.15	\$0.60
2	312771	HOSE	\$6.45	\$12.90

Figure 5. Record of parts received

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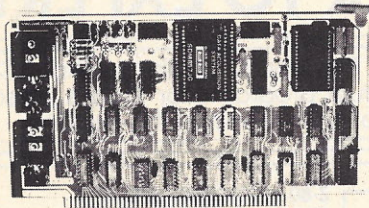
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CIRCLE INQUIRY NO. 5

LOST SALES THIS PERIOD		1-17-80	1-17-80
1	41110	1-17-80	
1	123196	1-17-80	

Figure 6. Lost sales

Lost sales are recorded (Figure 6), so that management can take the necessary actions to prevent their recurrence.

The Parts Search is used to rapidly determine the status and location of a part in response to a customer inquiry (Figure 7). This information is retrieved and displayed on the screen until it is desired to continue.

PARTS SEARCH

PART NUMBER ? 120177
PARTS SEARCH FINDINGS

WE HAVE 2 OF 120177 LOCKWASHER AT \$ 0.15 IN STOCK.

THE LOCATION IS H63

HIT RETURN WHEN READY

Figure 7. Parts search

The Sales Analysis Report may be run any time and the total sales for each part for the month and year to date will be printed (Figure 8). Operator entries are underlined. Figure 9 is the sales report output only. Totals are printed below each column.

The sales records are reset to zero at the end of each month while the year to date sales are allowed to accumulate.

A SALES ANALYSIS REPORT

S = SALES TOTALS

Z = PARTS WITH ZERO SALES

SELECT ACTION FROM TABLE ABOVE S

DO YOU WANT A PRINTED COPY? Y = YES, N = NO Y

SALES REPORT FOR 1-17-80

#	P/N	DESCRIPTION	THIS MONTH	YEAR TO DATE
2	001995	WASHER (N/A)	1 \$ 0.15	5 \$ 0.75
5	021195	NUT (N/A)	2 \$ 0.24	4 \$ 0.48
11	004372	PIN	1 \$ 0.15	2 \$ 0.3
26	121282	SCREW	4 \$ 2.4	5 \$ 3
TOTALS			2.94	4.53

RUN A SALES REPORT, PRINTED COPY, AT THE END OF EACH MONTH.

THEN, RESET THE MONTHLY SALES TOTALS TO ZERO. LIKEWISE, DO A YEARLY RESET AFTER THE LAST SALES REPORT OF THE YEAR

DO YOU WANT TO RESET SALES TO ZERO? Y = YES, N = NO N

Figure 8. Sales report analysis

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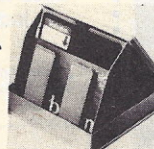
Verbatim FD 34 8000 Diskettes for the
TRS 80 MOD II: 10 for \$51.00



**MINI-DISK
Protectors**

Fit any 3-
ring binder.

Hold 2 diskettes and ID
cards. Vinyl. 10 for \$5.75.



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Molded plastic.
Hold 10 disk-

ettes.

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8-1/2" x 11" or 9-1/2" x 11",
green bar or plain. One part.
500 sheet box: \$9.25

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Disks, Etc.

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CIRCLE INQUIRY NO. 18

SALES REPORT FOR 1-17-80

#	P/N	DESCRIPTION	THIS MONTH	YEAR TO DATE
2	001995	WASHER (N/A)	4 \$ 0.6	4 \$ 0.6
5	021195	NUT (N/A)	2 \$ 0.24	2 \$ 0.24
11	004372	PIN	1 \$ 0.15	1 \$ 0.15
13	112840	BEARING	2 \$ 1.54	2 \$ 1.54
17	120395	KEY	1 \$ 0.32	1 \$ 0.32
20	121192	BOLT	4 \$ 2.72	4 \$ 2.72
26	121282	SCREW	1 \$ 0.6	1 \$ 0.6
31	121674	STOP NUT	1 \$ 0.54	1 \$ 0.54
34	121836	BUSHING	3 \$ 4.65	3 \$ 4.65
36	121838	PIN	1 \$ 1.1	1 \$ 1.1
58	122401	SPACER	2 \$ 0.82	2 \$ 0.82
119	172366	2+4 COND	6 \$ 13.5	6 \$ 13.5
165	172820	16 OZ PREM BL	1 \$ 2.75	1 \$ 2.75
208	173504	CONTROL W/RNG	1 \$ 64.95	1 \$ 64.95
218	173646	BINNACLE CONT	1 \$ 119.5	1 \$ 119.5
554	302493	O RING	1 \$ 0.48	1 \$ 0.48
986	304070	SCREW	1 \$ 0.15	1 \$ 0.15
1442	305745	SCREW	6 \$ 1.08	6 \$ 1.08
1552	306394	COTTER PIN	3 \$ 0.54	3 \$ 0.54
1852	307949	DRIVE PIN	3 \$ 0.96	3 \$ 0.96
2062	308799	GSKT	1 \$ 0.36	1 \$ 0.36
2099	309044	SEAL	1 \$ 5.5	1 \$ 5.5
2370	311130	GSKT	3 \$ 1.95	3 \$ 1.95
2371	311131	GSKT	2 \$ 0.68	2 \$ 0.68
2411	311508	GSKT	1 \$ 0.23	1 \$ 0.23
2533	312771	HOSE	1 \$ 6.45	1 \$ 6.45
2616	313284	RETAINER	1 \$ 2.1	1 \$ 2.1
2966	316506	BALL	2 \$ 0.3	2 \$ 0.3
TOTALS			234.76	234.76

Figure 9. Sales report

These totals are zeroed at the end of the year. Parts with zero sales may be printed at the end of the year to determine which parts should be considered for elimination from the inventory (Figure 10).

The SWAP option in the Table of Operations allows the data disk to be changed without endangering the data.

The program is written in Commercial BASIC. The report formats are established with the PRINT USING statements. The subroutine at line 900 is used whenever a choice is offered for Display or Printed copy. Line 700 is the Commercial BASIC command to initialize the data disk to avoid changing the data when exchanging data disks.

Users of the Parts Control Program have found they get more accurate information and they get it much faster. This means tighter control of the inventory with less effort and an increase in net profit. □

A
SALES ANALYSIS REPORT

S = SALES TOTALS

Z = PARTS WITH ZERO SALES

SELECT ACTION FROM TABLE ABOVE Z

DO YOU WANT A PRINTED COPY? Y = YES, N = NO Y
PARTS WITH ZERO SALES

1-17-80

PART NUMBER	DESCRIPTION	VENDOR	PRICE
3282	RECORDS	-	0
004270	NEEDLE VAL N/A	0	2
004419	STARTER ROPE	0	8.05
041110	307565	0	0
041188	316520	0	0
041195	301740	0	0
041205	314367	0	0
042137	ROPE	0	12.55
103867	WASHER	0	0.22
112840	BEARING	0	0.77
120052	WASHER	0	0.22
120110	LOCK RING	0	0.15
120177	LOCKWASHER	0	0.15
120395	KEY	0	0.32
120783	TAG	0	0.15
121025	WASHER	0	0.15
121192	BOLT	0	0.68
121200	SPACER	0	0.84
121267	121895	0	0
121268	BUSHING	0	0.4
121269	LEVER	0	3.5
121276	DETENT	0	0.51
121285	SCREW	0	0.22
121350	BRACKET	0	0.49
121670	BACK PLATE	0	12.4
121671	FRONT PLATE	0	10.1
121674	STOP NUT	0	0.54
121687	FITTING	0	1.4

Figure 10. Zero sales

TRS-80® CP/M® & CBASIC®
BUSINESS SOFTWARE

LOW-COST MOD II DISK EXPANSION

... over 610,000 bytes/disk with our
CP/M... plus many other features.Find out why ours is the **Better Business Buy!**

Model II CP/M (rel. 2.0) \$250.00

Model I CP/M (re. 1.5) 150.00

CBASIC 95.00

APH (Automated Patient History) 175.00

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system 300.00

MAGIC WAND® Word Processor 400.00

RM COBOL® (Z80 code) 750.00

Osborne & Assoc. CBASIC source programs—

O&A Payroll w/Cost Accounting. \$250.00

O&A Accts. Rec./Accts. Payable ... 250.00

O&A General Ledger w/Cash Journal. 250.00

O&A CBASIC books for above (each).... 20.00

Send 30¢ SASE for CP/M Users Group software
list & free "CP/M Primer".

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- RM COBOL is a registered trademark of Ryan-McFarland Corp.
- TRS-80 is a registered trademark of Radio Shack, a Tandy Company.
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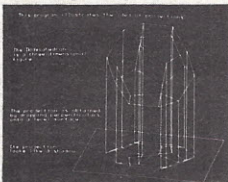
8041 NEWMAN AVENUE • SUITE 208 • HUNTINGTON BEACH, CALIFORNIA 92647

CAT-100 FULL COLOR
GRAPHICSThe original 256-color imaging system with
high resolution video FRAME GRABBER
for the S-100 bus.

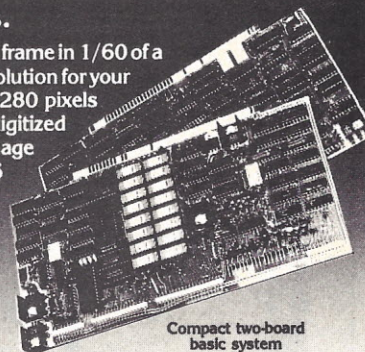
Capture and digitize a video frame in 1/60 of a second. Select the best resolution for your application, from 256 to 1280 pixels per TV line. Display your digitized or computer processed image with 256 gray levels or 256 colors on standard B&W, NTSC or RGB color TV monitors.



240x256 Digitized image, 16 levels



480x512 Computer-generated

Compact two-board
basic system

Features:

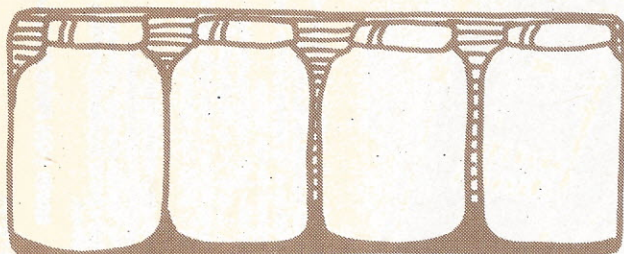
- Highest possible quality 480x512x8 digital video image presently available on the market
- Input capability from TV camera or other sources
- Variety of synchronization choices
- 2 selectable video A/D conversion circuits
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- Photographic trigger control input
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- Interfaces for TRS-80 and other processors
- Comprehensive line of accessories, monitors and support software

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DIGITAL GRAPHIC SYSTEMS

441 California Ave., Palo Alto, CA 94306 415/494-6088



PROGRAM LISTING

```

REM PARTS INVENTORY PROGRAM COPYRIGHT 1979 CHUCK ATKINSON
REM ROUTE 5, BOX 277-C FORT WORTH TEXAS 76126 (817) 654-2011
PRINT:PRINT:PRINT:PRINT:PRINT:PRINT:PRINT:PRINT:PRINT:PRINT:PRINT
PRINT:PRINT "PARTS OPERATIONS PROGRAM VERS 1.03"
SP$="POSTING"
10 N$="VENDOR"
FILE N$(150)
N=1
IF END #1 THEN 20
READ #1,N;NAM$,SR$,CTY$,ST$,Z$,PH$,RMK$,V$
20 CLOSE 1
PRINT:PRINT:PRINT"CAUTION ! !":PRINT:PRINT
PRINT "CHANGE DISKS IN DRIVE B ONLY WHEN AT THE TABLE OF OPERATIONS"
PRINT:PRINT"AND BY USING THE SWAP OPTION!":PRINT
PRINT:PRINT:INPUT"TODAY'S DATE?";LINE DATES
50 PRINT:PRINT:PRINT:PRINT:PRINT:PRINT:PRINT:PRINT:PRINT:PRINT:PRINT
PRINT TAB(15);"TABLE OF OPERATIONS"
PRINT:PRINT "S = SALES INVOICE";TAB(40);"R = RECEIVE SHIPMENT"
PRINT:PRINT "P = PURCHASE ORDER";TAB(40);"A = ANALYSIS REPORT"
PRINT:PRINT "L = LOST SALE";TAB(40);"F = FIND PART NUMBER"
PRINT:PRINT"SWAP = EXCHANGE DISKS IN DRIVE B";TAB(40);"END = END OF RUN"
PRINT:PRINT:INPUT "SELECT ACTION FROM TABLE ABOVE";X$
I=0
IF X$="S" THEN 100
IF X$="R" THEN 100
IF X$="P" THEN 100
IF X$="A" THEN 300
IF X$="L" THEN 400
IF X$="F" THEN 500
IF X$="SWAP" THEN 700
IF X$="END" THEN 9990
100 PRINT
IF X$="S" THEN PRINT "SALES INVOICE POSTING"
IF X$="R" THEN PRINT "RECEIVE PARTS POSTING"
IF X$="P" THEN PRINT "PARTS SEARCH"
CREATE "POSTING" RECL 40 AS 1
N=1
IF X$="F" THEN 105
104 PRINT:PRINT:INPUT "QUANTITY ? 0 = NO MORE.";Q
IF Q=0 THEN 106
105 PRINT:PRINT:INPUT "PART NUMBER ?";PN

```

```

OPEN "B:PART" RECL 80 AS 1
I=0
310 I=I+1
IF END #1 THEN 360
READ #1,I;P$,V$,M$,L$,LN$,D$,J,R,OH,MN,MX,OO,S,YT
IF S>0 THEN 320
GOTO 310
320 DOL=S*R:YDOL=YT*R:DT=D5+$7-2*5$7-"$5$7-1$7-
=3985 9{51V(10);P$;TAB(20);D$;TAB(40);S;" $";DOL;TAB(60);YT;" $";YDOL
GOTO 310
360 PRINT:PRINT TAB(20);"TOTALS";TAB(44);DT;TAB(63);YTDOL
CONSOLE:CLOSE 1
PRINT:PRINT"RUN A SALES REPORT, PRINTED COPY, AT THE END OF EACH MONTH."
PRINT:PRINT"THEN, RESET THE MONTHLY SALES TOTALS TO ZERO. LIKEWISE, DO A"
PRINT:PRINT"YEARLY RESET AFTER THE LAST SALES REPORT OF THE YEAR"
PRINT:PRINT:INPUT "DO YOU WANT TO RESET SALES TO ZERO? Y = YES, N = NO";Y$
IF Y$="Y" THEN 370
GOTO 50
370 PRINT:PRINT:INPUT "M = RESET MONTH & Y = RESET YEAR AND MONTH";X$
PRINT:PRINT"WARNING! THE RESET IS IRREVERSIBLE AND MAKES ALL SALES"
PRINT:PRINT"RECORDS ZERO FOR THE PERIOD REQUESTED."
PRINT:PRINT:INPUT"DO YOU STILL WANT TO RESET? Y = YES, N = NO";Y$
IF Y$="Y" THEN 380
GOTO 50
380 I=1
OPEN "B:PART" RECL 80 AS 1
382 I=I+1
IF END #1 THEN 390
READ #1,I;P$,V$,M$,L$,LN$,D$,J,R,OH,MN,MX,OO,S,YT
S=0
IF X$="Y" THEN YT=0
PRINT #1,I;P$,V$,M$,L$,LN$,D$,J,R,OH,MN,MX,OO,S,YT
PRINT I
GOTO 382
390 PRINT:PRINT"RESET COMPLETE"
CLOSE 1:GOTO 50
400 PRINT "PURCHASE ORDER"
PRINT:INPUT"VENDOR CODE? EXAMPLE, O. NO = NO MORE ORDERS.";A$
IF A$="NO" THEN 50
T=0:TT=0:PRINT:PRINT:INPUT "PURCHASE ORDER NUMBER?";PO
GOSUB 900
OPEN "VENDOR" RECL 150 AS 1
N=1
420 N=N+1
READ #1,N;NAM2$,SR2$,CT2$,ST2$,Z2$,PH2$,RMK2$,V$
IF V$=A$ THEN 450
GOTO 420
450 CLOSE 1
PRINT "PURCHASE ORDER # ";PO;" TO:";TAB(40);"FROM:";TAB(62);DATES$
PRINT:PRINT TAB(10);NAM2$;TAB(40);NAM$:PRINT TAB(10);SR2$;TAB(40);SR$
PRINT TAB(10);CT2$;" ";ST2$;TAB(40);CTY$;" ";ST$
PRINT TAB(17);Z2$;TAB(50);Z$
PRINT:PRINT "QUANTITY";TAB(10);"PART NUMBER";TAB(23);"DESCRIPTION";TAB(40);®
"PRICE";TAB(47);"DISC";TAB(52);"TOTAL";TAB(60);"LOC";TAB(70);"OH";TAB(75);®
"MAX"
OPEN "B:PART" RECL 80 AS 1
I=0
460 I=I+1
IF END #1 THEN 490
READ #1;P$,V$,M$,L$,LN$,D$,J,R,OH,MN,MX,OO,S,YT
IF MX=0 THEN 460
IF V$=A$ THEN 465
GOTO 460
465 IF OH<MN THEN 470
GOTO 460
470 LET O1=MX-OH:T=O1*R*(1-(J/100)):TT=TT+T
PRINT O1;TAB(10);P$;TAB(23);D$;TAB(39);R;TAB(47);J;TAB(51);T;TAB(60);®
L$;LN$;TAB(69);OH;TAB(75);MX

```



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PRINT #1,N;PN,Q
IF X$="F" THEN 106
N=N+1
GOTO 104
106 CLOSE 1:REM AUTO POSTING
IF X$="F" THEN 108
LPRINTER WIDTH 80
IF X$="S" THEN PRINT TAB(20); "SALES REPORT FOR ";DATE$
IF X$="R" THEN PRINT TAB(20); "PARTS RECEIVED ";DATE$
PRINT:PRINT"QUAN";TAB(8);"PART NUMBER";TAB(25);"DESCRIPTION";TAB(47);"PRICE"
;@
TAB(58);"TOTAL"
108 IF X$="F" THEN PRINT "PARTS SEARCH FINDINGS":PRINT
I=1:DT=0:ST=0:TAX=0:TAXT=0
OPEN "POSTING" RECL 40 AS 1
N=0
110 N=N+1
IF END #1 THEN 190
READ #1,N;PN,Q
OPEN "B:PART" RECL 80 AS 2
OPEN "B:INDEX" RECL 18 AS 3
R=1
IF END #3 THEN 115
112 READ #3,R;P,K
IF P=PN THEN 115
IF P>PN THEN 115
R=R+1
GOTO 112
115 I=K
IF K>50 THEN I=K-50
CLOSE 3
IF END #2 THEN 195
118 READ #2,I;P
IF P=PN THEN 120
I=I+1
GOTO 118
120 READ #2,I;P$,V$,M$,L$,LN$,D$,J,R,OH,MN,MX,OO,S,YT
IF X$="F" THEN PRINT "WE HAVE ";OH;" OF ";P$;" ";D$;" AT $";R;" IN STOCK."
IF X$="F" THEN PRINT:PRINT "THE LOCATION IS ";L$;LN$
IF X$="F" THEN PRINT:PRINT:INPUT "          HIT RETURN WHEN READY";
IF X$="F" THEN CLOSE 2:GOTO 1000
ST=Q*R:TAX=.04*ST:DT=DT+ST:TAXT=TAXT+TAX
IF X$="R" THEN TAXT=0
PRINT USING @
"### /1234567...../ /1234567890123456/ $$$$### $$$$$### ";@
Q,P$,D$,R,ST
IF X$="S" THEN OH=OH-Q
IF X$="S" THEN S=S+Q
IF X$="S" THEN YT=YT+Q
IF X$="R" THEN OH=OH+Q
IF X$="R" THEN OO=OO-Q
PRINT #2,I;P$,V$,M$,L$,LN$,D$,J,R,OH,MN,MX,OO,S,YT
CLOSE 2:GOTO 110
190 IF X$="S" THEN PRINT USING "TOTAL $$$$###.###";TAB(45);DT
IF X$="S" THEN PRINT USING "TAX $$$$###.###";TAB(45);TAXT
TOT=DT+TAXT
IF X$="S" THEN PRINT USING "TOTAL $$$$###.###";TAB(45);TOT
CONSOLE:CLOSE 1:GOTO 50
195 PRINT:PRINT "PART NUMBER ";PN;" NOT FOUND. PLEASE CHECK IT."
CLOSE 2:GOTO 110
300 PRINT "SALES ANALYSIS REPORT"
PRINT:PRINT "S = SALES TOTALS";TAB(40);"Z = PARTS WITH ZERO SALES"
PRINT:PRINT:INPUT "SELECT ACTION FROM TABLE ABOVE";X$
IF X$="S" THEN 305
IF X$="Z" THEN 600
305 GOSUB 900
ST=0:DT=0:YT=0:PRINT:PRINT "SALES REPORT FOR ";DATE$
PRINT:PRINT "#";TAB(10);"P/N";TAB(20);"DESCRIPTION";TAB(41);@
"THIS MONTH";TAB(60);"YEAR TO DATE"

```

```

IF OO>1 THEN PRINT "THERE ARE ";OO;" OF P/N ";P$;" ALREADY ON ORDER."
OO=OO+01
PRINT #1,I;P$,V$,M$,L$,LN$,D$,J,R,OH,MN,MX,OO,S,YT
GOTO 460
490 PRINT USING "TOTAL ORDER IS $$$$###.###";TT
CLOSE 1
CONSOLE:GOTO 400
500 PRINT:PRINT"RECORD LOST SALE"
LS$="LOST"
FILE LS$(30)
I=1
IF END #1 THEN 510
READ #1,I;N
I=N+1
GOTO 515
510 PRINT #1,I;1
I=2
515 IF END #1 THEN 520
READ #1,I;Q,P$,DATE$
520 PRINT:PRINT:INPUT"QUANTITY?";Q
PRINT:PRINT:INPUT"PART NUMBER?";LINE P$
N=I
PRINT #1,I;Q,P$,DATE$
I=1
PRINT #1,I;N
CLOSE 1
PRINT:INPUT "REVIEW LOST SALES? Y = YES, N = NO";X$
IF X$="N" THEN 50
GOSUB 900
PRINT "LOST SALES THIS PERIOD";TAB(62);DATE$
FILE LS$(30)
I=1
530 I=I+1
IF END #1 THEN 560
READ #1,I;Q,P$,DATE$
PRINT Q,P$,DATE$
GOTO 530
560 CONSOLE:CLOSE 1
PRINT:PRINT:INPUT "WANT TO RESET LOST SALES FILE TO ZERO? Y = YES, N = NO";X$
IF X$="N" THEN 50
CREATE "LOST" RECL 30 AS 1
CLOSE 1:GOTO 50
600 GOSUB 900
PRINT"PARTS WITH ZERO SALES";TAB(62);DATE$
PRINT:PRINT"PART NUMBER";TAB(17);"DESCRIPTION";TAB(47);"VENDOR";TAB(55);"PRI
CE"
OPEN "B:PART" RECL 80 AS 1
I=1
610 I=I+1
IF END #1 THEN 660
READ #1;P$,V$,M$,L$,LN$,D$,J,R,OH,MN,MX,OO,S,YT
IF S=0 THEN PRINT P$;TAB(17);D$;TAB(47);V$;TAB(55);R
GOTO 610
660 CLOSE 1:GOTO 50
700 PRINT:PRINT "EXCHANGE DISKS IN DRIVE B ONLY"
PRINT:INPUT "THEN HIT RETURN";
CALL 264
GOTO 50
900 PRINT:INPUT "DO YOU WANT A PRINTED COPY? Y = YES, N = NO";X$
IF X$="Y" THEN LPRINTER WIDTH 80
RETURN
1000 CLOSE 1:GOTO 50
9990 PRINT:PRINT:PRINT"ARE THE BACK UP FILES CURRENT?"
9995 PRINT:PRINT:PRINT "REMOVE DISK FROM DRIVE BEFORE TURNING OFF POWER"
PRINT:PRINT:PRINT "SMALL BUSINESS COMPUTERS D/FW TEXAS":PRINT:PRINT
9999 END

```

A>

**DISK DRIVE WOES? PRINTER INTERACTION?
MEMORY LOSS? ERRATIC OPERATION?
DON'T BLAME THE SOFTWARE!**



ISO-1



ISO-2

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Dept. IF

CIRCLE INQUIRY NO. 23

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- FULL SCREEN window displays with forward and backward scrolling for editing your data a page-at-a-time, rather than line-by-line.
- Provides you with all the features found on the large mainframe and minicomputer editors, such as IBM, UNIVAC, CDC, and DEC.
- Commands include forward or backward LOCATE, CHANGE, and FIND; and INSERT, DELETE, REPLACE, APPEND, SAVE, PRINT, WINDOW, MACRO, TABSET, SCALE, DUMP, and others.
- Compatible with existing CP/M edit and text formatted files, with CBASIC, and with Microsoft's MBASIC, FORTRAN, COBOL, and ASSEMBLER.
- CHANGE commands allow you to make conditional changes and to use variable length strings.
- Designed for CP/M and derivative operating systems, including LIFEBOAT, CDOS, IMDOS, DOS-A, ADOS, etc.
- GET and PUT commands for concatenating, moving, duplicating, and merging your edit files on the same or different diskettes.
- Provides you with fast memory-to-memory COPY commands, and an intermediate buffer for copying lines over-and-over.
- Saves your last LOCATE, CHANGE, FIND, and APPEND command for easy re-execution.
- Simple line-oriented commands for character string editing.
- Safeguards to prevent catastrophic user errors that result in the loss of your edit file.
- INLINE command for your character-oriented editing.
- Designed for today's CRT's, video monitors, and teletypewriter terminals.
- Thoroughly field tested and documented with a comprehensive User's Manual and self-instructional tutorial.

And remember — in today's interactive programming environment — your most important software tool is your text editor. ED-80 is already working in industry, government, universities, and in personal computing to significantly cut program development time and to reduce high labor costs. Why not let ED-80 begin solving your text editing problems today? ED-80 is protected by copyright and furnished under a paid-up license for use on a single computer system. Single Density Diskette and Manual: \$99.00, or the Manual alone: \$20.00 (credited with purchase of the Diskette). Specify Disk make/model, 5" or 8", hard or soft sector. ORDER NOW and we'll pay the postage!

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COMPUTER CLUB DIRECTORY

This directory was compiled to inform readers of clubs in their areas.

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1776 Raritan Rd., Scotch Plains, NJ 07076
Jeff Kashinsky, President (201) 536-1078

Amateur Radio Research and Development Corporation
1524 Springvale Ave., McLean, VA 22101
Paul Rinaldo, President (703) 356-8918

Boston Computer Society
17 Chestnut Street, Boston, MA 02108
(617) 227-9178

New England Computer Society
P.O. Box 198, Bedford, MA 01730
Eric Johansson (617) 562-6716

Philadelphia Area Computer Society
P.O. Box 1954, Philadelphia, PA 19105
PACS Hotline (215) 467-0177

Rochester Area Microcomputer Society
P.O. Box 90808, Rochester, NY 14607
Mike Ciaraldi (716) 467-0177

Alamo Computer Enthusiasts
4847 Castle Shield, San Antonio, TX 78218
David Samson (512) 656-8469

Computer Hobbyists Group of North Texas
P.O. Box 1344, Grand Prairie, TX 75051
Garrett Davis (214) 559-2710

Crescent City Computer Club
University of New Orleans
P.O. Box 1097, New Orleans, LA 70122
David Hughes (504) 271-5540

Denver Amateur Computer Society
1380 S. Santa Fe, Denver, CO 80223
Mike Dmytrasz (303) 697-5800

Southeastern Michigan Computer Organization
Box 02426, Detroit, MI 48202
S.E.M.C.O. Newsline (313) 775-5320

Utah Computer Association
378 East 9800 South, Sandy, UT 84070
Lawrence Barney, President (801) 571-9661

Space Coast Micro Computer Club
315 Inlet Avenue, Merritt Island, FL 32952
Ray Lockwood, President (305) 452-2159

Homebrew Computer Club
P.O. Box 626, Mountain View, CA 94042
Bob Reiling, President (415) 967-6754

Northwest Computer Society
P.O. Box 4193, Seattle, WA 98104
(206) 284-6109

San Diego Computer Society
P.O. Box 85137, San Diego, CA 92138
(714) 571-5550

Solus Computer Club
1690 Woodside Road, #219
Redwood City, CA 94061
S. Sokolow (415) 368-3331

Connecticut Computer Club
18 Ridge Court W., West Haven, CT 06516
Leo Taylor (203) 933-5918

TCUG (TRS Computer User's Group)
P.O. Box 2235, Reston, VA 22090
Ron Hickey (703) 241-2878

Proteus (International Processor
Technology User's Group)
1690 Woodside Road, #219, Redwood City, CA 94061
S. Sokolow (415) 368-3331

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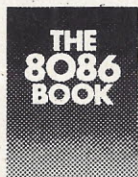
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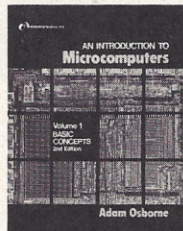
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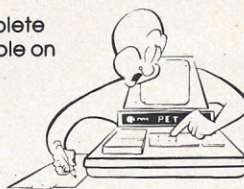
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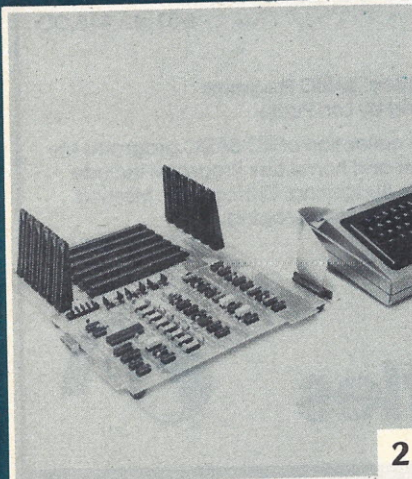
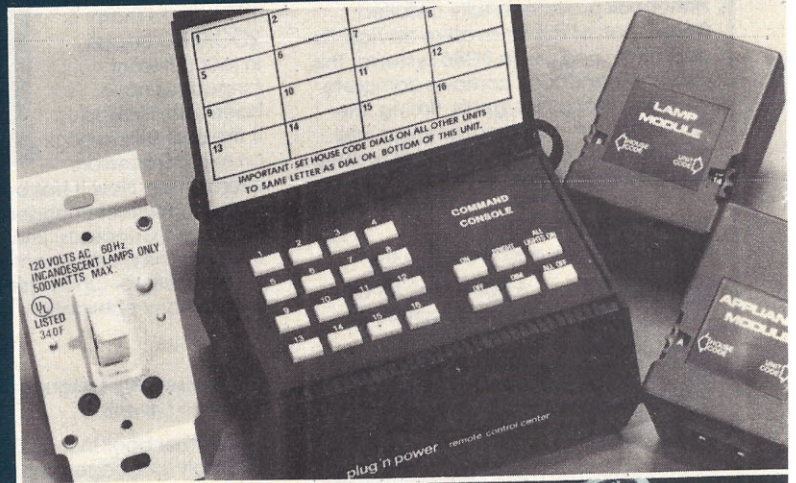
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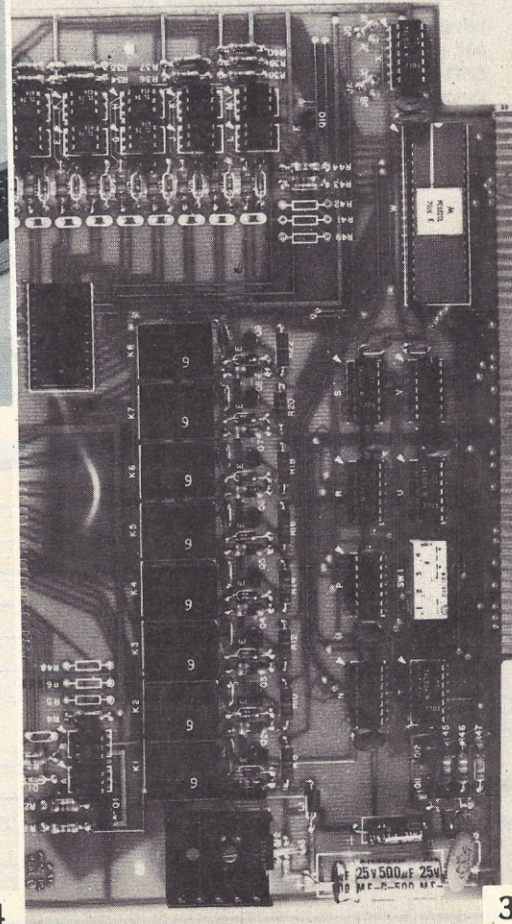
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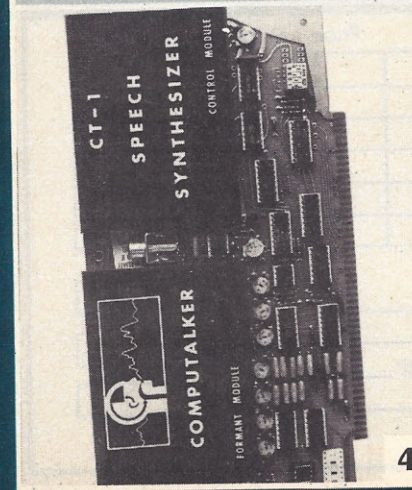
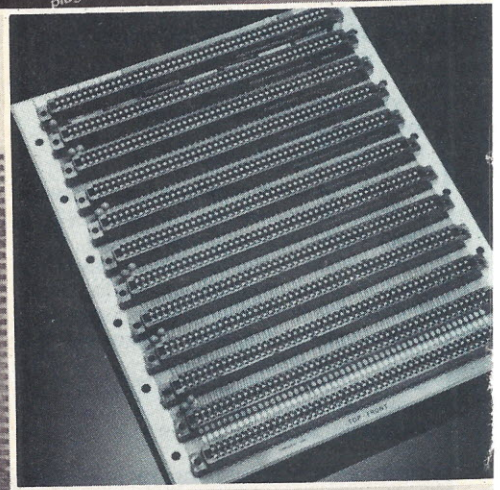
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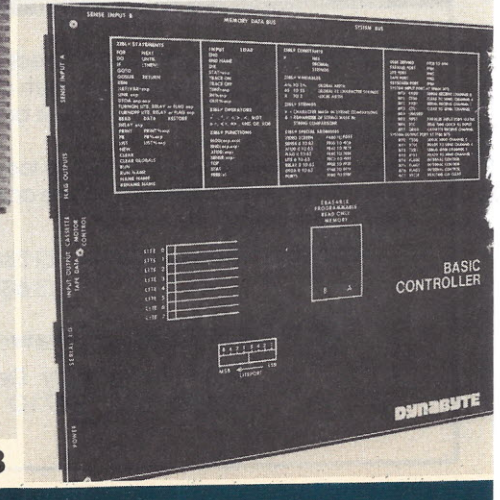
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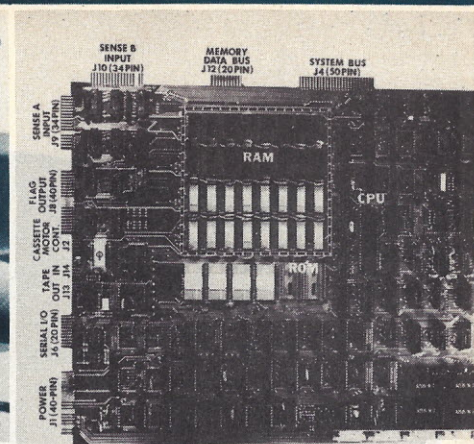


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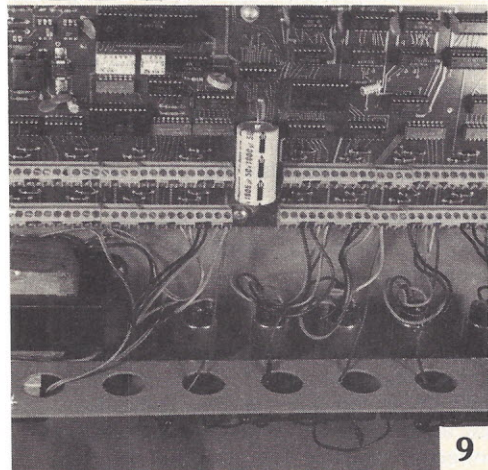




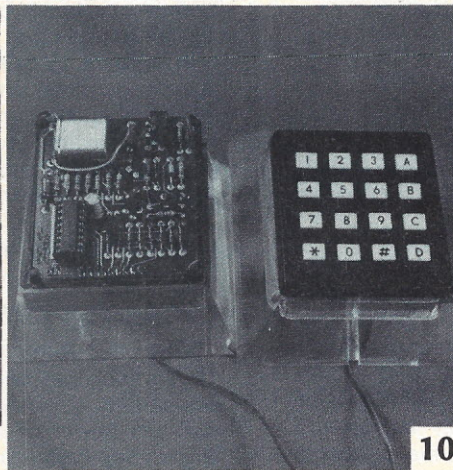
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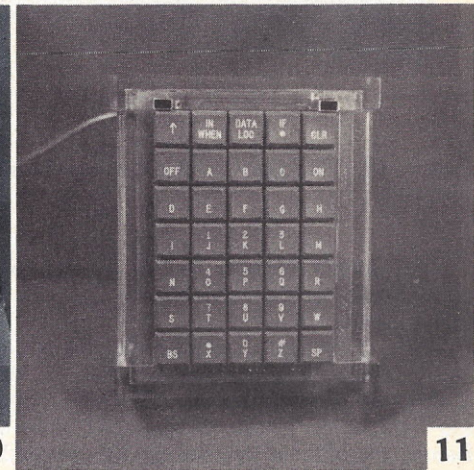
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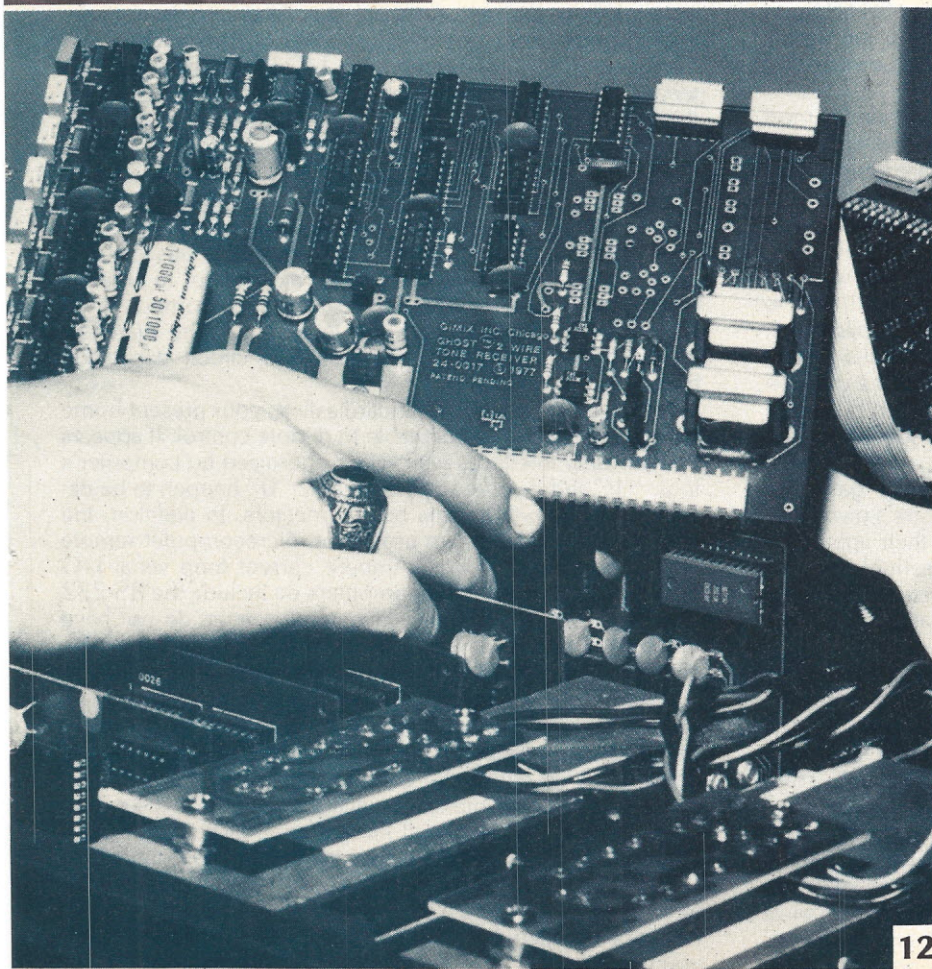
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Figure 1. Plug 'n Power wireless remote control system carried by Radio Shack.

Figure 2. The California Computer Systems Mini-8100 S-100 bus adapter for the Radio Shack TRS-80.

Figure 3. The Altair Process Control Interface.

Figure 4. The Computalker S-100 bus Speech Synthesizer.

Figure 5. The California Computer System 13-slot S-100 motherboard.

Figure 6. Dynabyte's BASIC controller showing front panel legends and edge card connector identifications.

Figure 7. The BASIC controller's edgecard identification and locations on the main circuit board of the BASIC controller.

Figure 8. Gimix' relay driver board.

Figure 9. Relay driver board's electronic control circuit.

Figure 10. The Gimix 16-key remote keyboard showing front and back views of keys and tone generating electronic circuits.

Figure 11. The Gimix 35-key remote keyboard.

Figure 12. The Gimix two-wire tone receiver interface for use with 16- and 35-key remote keyboards. (SS-50 bus connector)

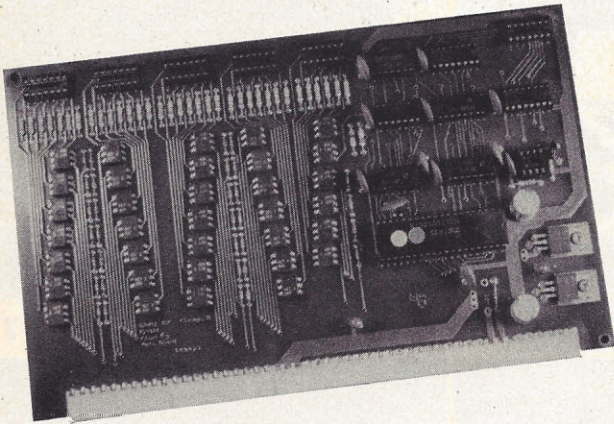


Figure 13. The Gimix self-scanning 34-port opto-coupler interface.

Every microcomputer has an inherent ability to exercise control over remote devices when provided with an appropriate interface.

This can be best dramatized by the way microcomputers are daily controlling magnetic disk or tape data storage devices, displaying data on CRT video terminals, or producing hardcopies of the display CRT data on line printers. Before any of these devices can be operated, the microcomputer must contain the appropriate serial or parallel I/O port interface to transmit start or stop commands to the device and for the transmission or reception of data between the microcomputer and the device.

The majority of microcomputers have been designed to meet the small businessman's accounting, payroll, inventory, and corresponding requirements. Public schools are rapidly turning to low cost microcomputers as teaching aids in the classroom. Microcomputers are finding a home anywhere data acquisition and manipulation of data are prime requisites.

With so much emphasis on accounting and data manipulation, it would appear the industry has yet to find time to adapt the microcomputer to remote control applications. One reason may be that no one has yet developed a universal compatible remote control interface. Most of the work on model robots and household appliances has been by young hobbyists and experimenters who created special single-make microcomputer control interfaces.

Thousands of microcomputers are presently gathering dust in attics because the prestige of owning one's own computer has faded, computer games have lost their appeal, or using the computer for personal and household finances died for the lack of adequate software. It's time to dust them off, and put them to work in energy conservation and home security control.

The first step would be to develop an understanding of remote control and then apply your microcomputer to control the functions of your home. Basically, the term remote control refers to the act of controlling a distant device, activity, or process by means of cables, lines, radio signals, computer coded signals, or light.

One form we are all familiar with is the common wall-mounted light switch. Flip the switch and we turn on a lamp across the room. In this instance, the remote control device is the wall switch and the household electrical wiring is the connection between the switch and the lamp. It should be noted that in remote control, some form of

manual action is required, i.e., adjust light sensitivity on light activated switch; set thermostat set point (temperature in degrees); flip wall switch; depress TV remote control switch; turn on radio transmitter.

There is another type of "wireless" system that employs a low power FM radio signal modulated by an audio tone. When this FM radio signal is applied to the household electrical wiring system, it operates a receiver connected to any electrical outlet in the house. The wireless intercom units were the first to employ this principle and in effect were a type of remote control device. Today, the wireless has been carried into the remote control era by the 16-channel Plug 'n Power remote control system shown in Figure 1.

As many as 16 FM receiver wall switches, lamp modules, or appliance modules can be controlled from a single remote control center. Each receiver switch or module can be turned on or off individually by pressing its corresponding pushbutton on the control center's panel. A "panic" button permits all light switches to be turned on in event of prowlers and all can be turned off at once when the danger has passed.

In addition to being wireless, the Plug 'n Power system permits as many remote control centers as the house has rooms. You can turn on a light at one part of the house and turn it off when you reach another part. This is possible because each numbered button generates the same audio tone for each center unit.

These examples of simple remote control applications serve to stress the need for a method of feedback to assure than an action has taken place.

COMPUTER COMPATABILITY

When Ed Roberts launched the microcomputer era in 1974, there was only one microcomputer. . . only one data bus system. . . the Altair 8800 computer and the Altair data bus. You knew that any add-on interface would have the 100 finger edge-card connector required for your microcomputer. When the popularity of the Altair microcomputer mushroomed from one into hundreds of manufacturers of microcomputers, add-on memory, I/O ports, and special interface suppliers, there was absolutely no standardization for the design of microcomputers and accessories. The only attempt was in the data transfer rate for cassette data storage. Even the Kansas City Standard of 300 baud was a fiasco because of the archaic slow rate of data transfer in comparison to the 19.2K transfer rate and higher today.

So hectic was the rush for proprietary data bus connections that it appeared to be a deliberate attempt to create a captive market. Once you purchased a microcomputer, the lack of compatibility forced you to purchase the manufacturer's line of add-on accessories and circuit expansion boards at any cost.

Because of this lack of standardization, your present home computer may not be adaptable to remote control. It appears that the only interfaces with relays energized by computer's logic "1" and de-energized by a logic "0" happen to be designed for the S-100 data bus connectors. In addition, the only relay external system usable for microcomputer remote control requires a 20 milliAmpere current loop serial I/O port. Although most microcomputers do include the RS-232 serial I/O port for cassette data storage, most do not have the option by which this type of serial I/O port may be changed to a 20 milliAmpere current loop function.

Where remote control feedback signals originate from an analog or continually variable type of signal, your microcomputer must be able to convert the analog signal into the digital form usable by the computer. In some cases, where no analog to digital interface is available, you have the option of a prototype circuit board kit that enables you or a computer service to assemble a custom made A/D converter.

For household remote control applications, it is necessary to employ hard-wired circuits from the computer to the remote controlled device. While this is not unsurmountable if you own your home, it is definitely not recommended if you

rent or lease. For those building a home, the addition of remote control wiring as an integral part of the electrical wiring system should be given priority consideration.

GETTING STARTED WITH REMOTE CONTROL INTERFACES

The TRS-80 was designed for small business accounting functions and is least adaptable to remote control use. Not only did the TRS-80 have a low data transfer rate, 250 baud for Level I or 500 baud for Level II, the serial I/O port was strictly for cassette data storage. Now TRS-80 owners can add an RS-232C serial interface with data transfer rates software selectable to 19.2K baud.

Figure 2 illustrates the California Computer Systems Mini-8100 adapter with a 6-slot motherboard as it would be connected to the TRS-80 computer/keyboard expansion slot connector. With this adapter, the TRS-80 can add a variety of features not possible without the Mini-8100. As an example, Figure 3 shows the S-100 process control interface by Altair that contains a total of 8 relays, each with the capacity to control 120 volts AC at 1 ampere. Relays are energized by a logic 1 or de-energized by a logic 0. All input data lines are buffered by the use of opto-couplers to function over a wide range of input voltage levels. Figure 4 illustrates the S-100 speech synthesizer to enable your TRS-80 to talk to you.

For those who own an S-100 microcomputer, Figure 5 shows the CCS 12-slot motherboard for expanding your present S-100 circuit board capacity. You need only extend the S-100 power connections from the mainframe to the external motherboard and plug in your S-100 circuit boards.

An alternate to those computers whose design and incompatibility make it impossible for remote control applications,

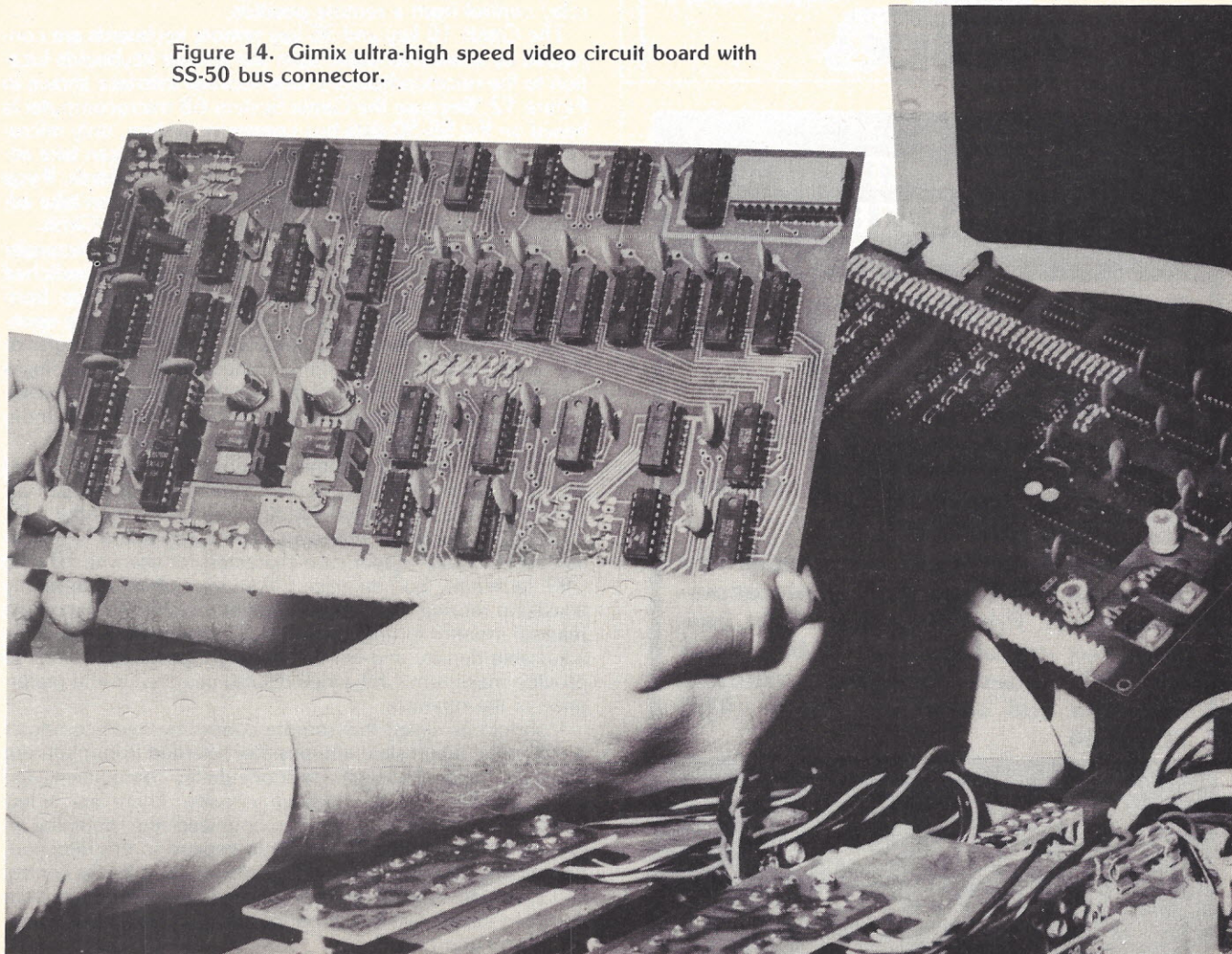
Dynabyte Inc. has developed a Basic Controller microcomputer with remote control specifically in mind (Figure 6). Each edge-card connector along both sides and top of the computer main circuit board is clearly identified on the front panel as well as the key commands for using the unique Zibll or Zilog industrial BASIC language.

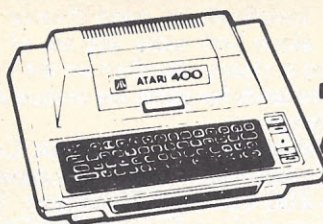
Designed primarily for industrial control, the Basic Controller contains 8 on-board relays with 4 reed relays capable of handling from 10 VA to 200 VDC at 0.75 ampere. The remaining 4 relays have a capacity from 5 amp at 26 VDC to 2 amp at 220 VAC. All relays are memory mapped and occupy the listed memory address:

RELAY	RELAY TYPE	ADDRESS
0	Heavy duty	FF00
1	Heavy duty	FF01
2	Heavy duty	FF02
3	Heavy duty	FF03
4	Reed	FF04
5	Reed	FF05
6	Reed	FF06
7	Reed	FF07

The Basic Controller contains two RS-232 serial interface I/O ports. One is to interface with a cassette data storage and the other is selectable for a 10 milliAmpere current loop. The Basic Controller also contains 32 memory mapped sense inputs for remote control feedback data signals. Two sense sections, A and B, are shown at the upper left hand corner of Figure 7. The Basic Controller offers on-board RAM to 16K and expandable to 48K with out-board RAM circuit boards.

Figure 14. Gimix ultra-high speed video circuit board with SS-50 bus connector.

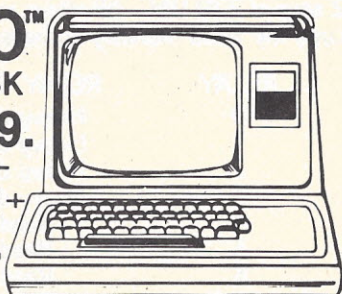




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Adapting microcomputers to remote control has been discouraging because of the limitations in relay power controlling ability. Even Dynabyte's Basic Controller relays are limited to a maximum of 440 watt control capacity. What then can one do to control household appliances with over 500 watt power requirements? There is a product called the relay driver board that controls up to 31 different circuits at more than 2500 watt power requirements for each circuit. Known by the trademarks of Gimix and Ghost, Gimix Inc. not only produces the ideal power handling relay circuits, the relays can be controlled by any microcomputer with a 20 mAmp current loop serial I/O port. Figure 8 shows the Gimix relay driver board with its General Electric RR-8, 20 amp latching relays.

Once the computer activates the relay, it latches and requires no power to remain latched. As many as 31 GE RR-8 relays may be mounted on the panel and, where additional control circuits are required, as many as three boards may be connected in series for a total of 93-20 Amp control circuits. Figure 9 shows the main relay control circuits. Referring back to Figure 8, note the relay status displayed on the CRT. A status report may be requested for any one of 93 relays or the relays may be scanned for a full report on all relay status conditions when the relay driver board is used in conjunction with the Gimix opto-coupler.

Figure 10 illustrates the 16 key tone generating remote control keyboard that can be used in conjunction with the relay driver board to control the relay functions from distances up to a mile from the microcomputer. A simple 3-number code automatically transfers the relay control from the computer keyboard to the 16 key remote keyboard or back to the main computer. Figure 11 pictures the Gimix 35 key remote keyboard which offers greater flexibility as well as relay control from a remote position.

The Gimix 16 key and 35 key remote keyboards are connected by a two-wire cable from the remote keyboards location to the microcomputer's tone receiver interface shown in Figure 12. Because the Gimix System 68 microcomputer is based on the SS-50 data bus connector system, only microcomputers using the same type bus connectors can take advantage of the Gimix tone-operated remote keyboards. If you happen to own an SWTP microcomputer, you can take advantage of all the control interfaced produced by Gimix.

Figure 13 presents one of the largest capacity opto-coupler interfaces produced. This interface provides 34 switched ports, each with its own opto-coupler for protection from switched voltages. It is an ideal interface to monitor the opening or closing of doors and windows, monitoring burglar or fire alarm devices, clocks, timers, thermostat controls, fuses and lighting circuits. Each of the switched ports are constantly scanned by the opto-board and contains a built-in memory buffer that saves up to 64 switch-closed signals.

Figure 14 shows the Gimix ultra high speed video board with dual video display capability. Sixteen line displays of 32 upper case characters give reading ease of the monitor CRT from across the room distances. The video board is switchable to 16 line 64 upper case characters for use with 10MHz CRT terminals. Full interlace EIA video output enables any television receiver on a master antenna system to become a readout monitor for the computer. The video board contains adjustable density and left hand margin position controls to provide maximum CRT video display centered to the preference of the operator.

It should be stated that remote control by microcomputer is still in the infant state and possibly retarded from maturing into a full fledge field by the lack of industry compatibility and the availability of vital interface circuits. There are a few giants of industry that have recognized the potential in remote control, and have begun to expand in this direction. Fortunately, industry has taken giant steps in process control and computer control of machines but only through custom designed computers based on the microprocessor as the central processing unit. □

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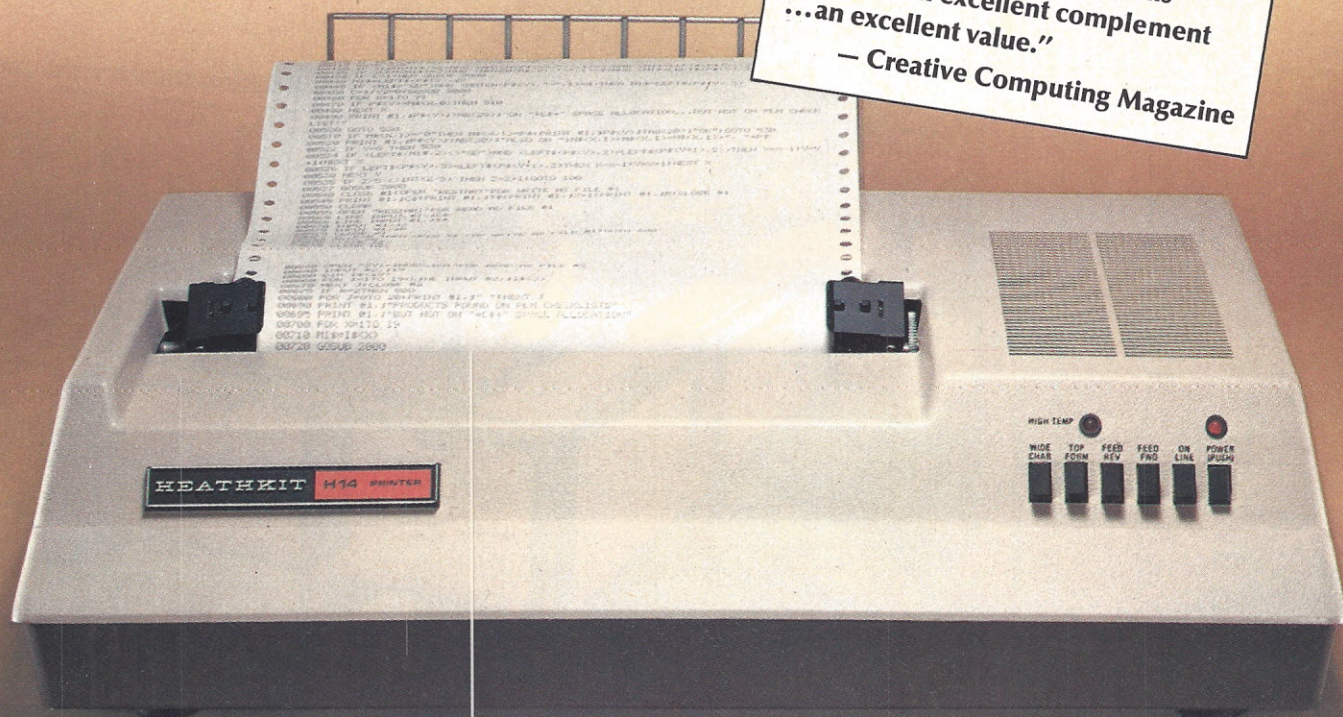
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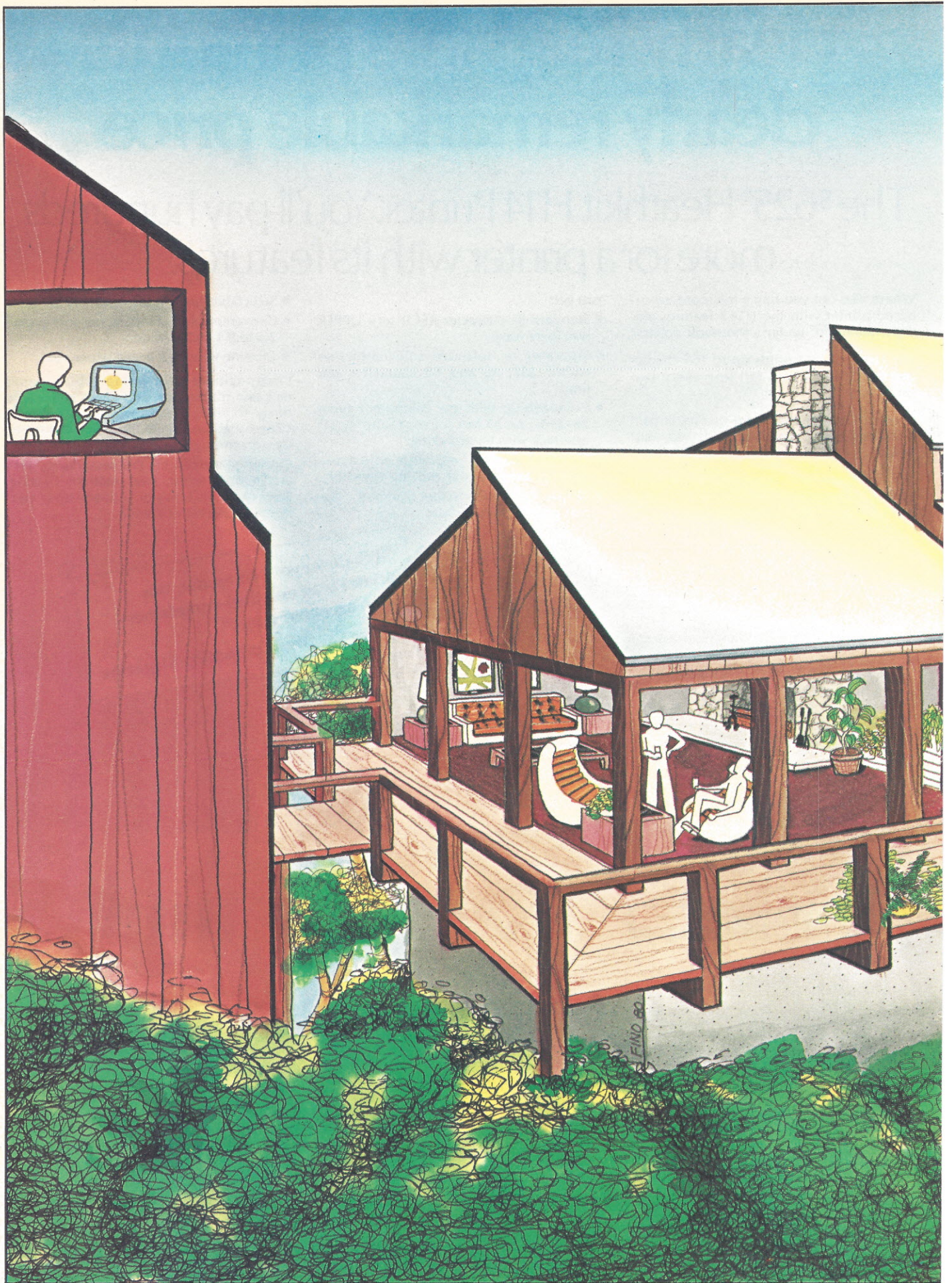
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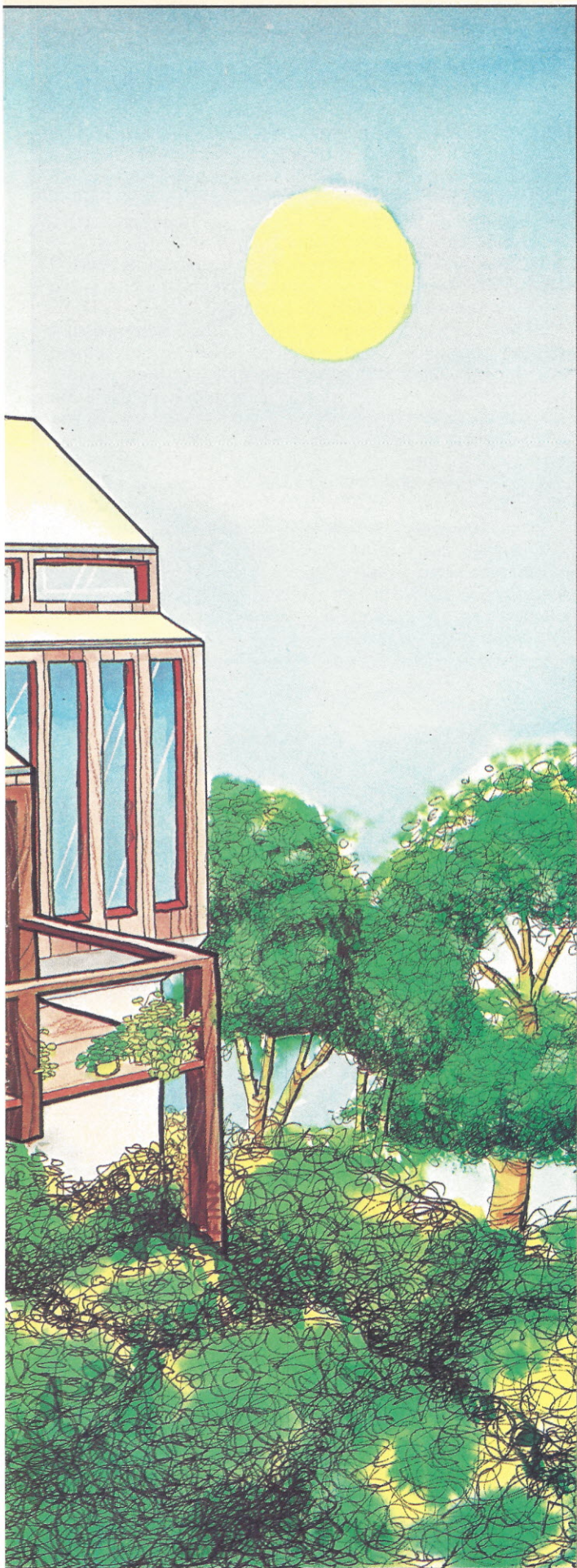
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CONTROL THE SUN WITH YOUR MICRO

By Dean Carstens

Although most home computers prove their worth — balancing checkbooks, playing games, tabulating complex calculations — I wanted to use mine for more practical projects. Since I live in a partially solar-heated home, a logical choice was to design a system to monitor and control the solar collector. The following describes the system, the programs, and the simple hardware that interfaces the computer to the collector. Much of what will be described is also applicable to more conventional heating systems.

I needed a system to periodically monitor temperatures at at least two points (the collector and the heated room area) and to turn on the collector's fan whenever the temperature rose above a set point. This is known as a "smart" data-logger. The minimal cost is several thousand dollars. Fortunately I had the necessary microcomputer with TV monitor. A little experimentation led me to a simple interface circuitry for under \$20.

For a similar system, virtually any microcomputer can be used if it has at least one input and one output port accessible from BASIC with a means of entering a machine language program during execution. Since the temperature conversions require speed, a short machine-language program must be used. My computer uses an 1802 microprocessor implementing a 16-bit, integer (TINY) BASIC. The program and interpreter occupy about 6K of memory, but a more efficient BASIC will use less.

HARDWARE

Although there are many ways to measure temperature with a microcomputer, most use linear transducers digitized with analog-to-digital converters. Such circuits are fast and accurate (often to a tenth of a degree or better). I wanted something that was simple and inexpensive, using readily available components accurate within a degree or so (after calibration). The converter I built is shown in Figure 1.

Temperature conversion is made as follows: A thermistor (R_1), a resistor with a high (and negative) temperature coefficient, is used as a temperature probe and is tied into a squarewave multivibrator circuit based on an NE555 timer. The output of the timer is connected to one data line of an input port to the computer. The computer determines the on period of the squarewave by periodically sampling the input byte and checking the bit corresponding to this data line. The on time of the circuit is inversely related to temperature since the frequency of the multivibrator depends on the resistance of the thermistor. Finally, the computer converts this time to temperature using a table look-up technique in the main BASIC program. With one port, up to eight temperatures can be monitored by repeating the multivibrator circuit.

The resistance of the thermistor and the capacitance of the timing capacitor are chosen for times sufficiently long to give high accuracy consistent with stability. For this timer, the output is low over the time period t_a to $t_b = 0.693 R_2 C_1 \cong 1$ msec for the values shown in the figure. Likewise, the output is high from t_b to $t_c = 0.693 (R_1 + R_2) C_1 \cong 0.693 R_1 C_1 \cong 1$ sec with the thermistor used.

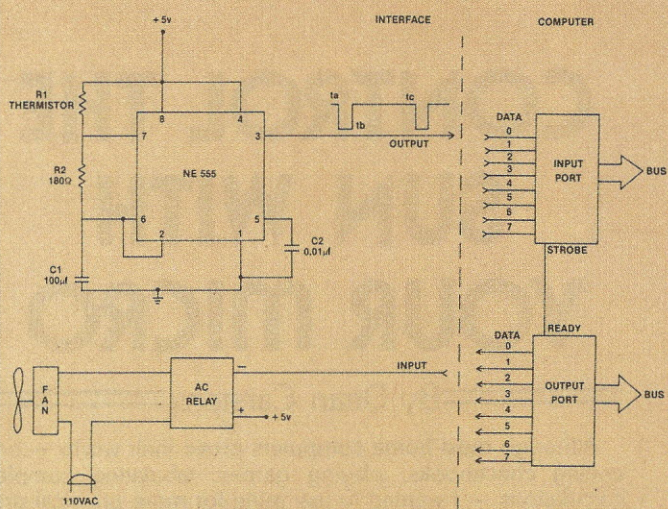


Figure 1. Sample converter.

The rest is even simpler; the output port drives a TTL-compatible AC relay that controls the fan. Note that the other bits can be used for other control functions using suitable relays. The port must be buffered, supplying enough current to drive the relays; and any AC relays used must provide sufficient isolation to protect the computer.

The "data ready" line of the output port is connected to the "data strobe" line of the input port, allowing the computer to latch the input port by outputting a switch byte. Other configurations are possible. For instance, a clock line could be used to strobe the input port, continuously sampling the data lines. However, without ready access to your computer bus, this is the easiest method.

The construction of the interface is straightforward. Since it draws little power, it can probably feed from the main 5-v power supply without problems. I soldered each thermistor probe to a long, two-conductor cable terminating in a phono-jack for easy connection to the multivibrator. To make a sturdy probe, the thermistor was cast in 5-minute epoxy resin, using a short piece of soda straw as a mold. All components are available locally except the thermistors, which can be purchased from Allied Electronics (part #791-0610, 100 kohms at room temperature). A high quality, low leakage capacitor should be used in the timing circuit for long-term stability.

Note that the output of each temperature interface (Figure 1) can be connected to any of the data input lines. I used D₆ and D₇. Likewise, the data output lines can be connected in any combination to the control relays; I used D₇.

TEMPERATURE CALIBRATIONS

The machine language program used to convert the time intervals from the multivibrator to a digital number is needed before calibrations can be made. Since this program is dependent on the microprocessor used, I will present it in the form of a flowchart (Figure 2). Anyone proficient in writing machine language programs can create his own.

In my version of Tiny BASIC, a jump to a machine language program is made with a USR function that carries two numerical variables into the routine and returns with one. It is called by a statement such as

LET A = USR(8000, N, M)

where 8000 happens to be the start of the routine and N and M are the two input variables. N specifies the switch byte output by the port and used to turn on and off the control relays. For my circuit (for the relay connected to D₇), if N = 11111111_{binary} = 255_{decimal}, all lines are high. To turn on the relay, the program outputs N = 01111111_{binary} = 127_{decimal}. The variable M is a second 8-bit number that

specifies the input channel to be read. Within the routine, M is treated as a mask byte and is ANDed with the input byte to give 1 if the high is high, or 0 if low. Again for my setup, M = 128 for the D₇ channel and M = 64 for the D₆.

The machine language routine periodically calls a sub-routine (READ in the figure) which outputs N, strobing the input byte which is then read and ANDed with M. The main part of this routine consists of three loops with tests based on the result of the AND operation. The first waits for a high-to-low transition (t_a in Figure 1). The second loop then waits for t_b . During the third, which waits for t_c , the 16-bit counter A is incremented each time the loop is traversed. On return to the BASIC program, A thus contains a number which is proportional to the time period t_b - t_c and related to the temperature.

Before calibrations begin, a decision must be made as to program accuracy. Theoretically, a table can be prepared with 1° or better accuracy. You are limited by the size of the memory and, more importantly, your patience. Each data point of the calibration must be entered into the look-up table as a statement or a data value; this takes time. I calibrated the probe reading the room temperature at 2° intervals over the 50-75° region and the other at 5° intervals over the 60-130° region. This covered the normal operating temperatures expected with suitable accuracy.

The calibration is done with a thermos bottle and an accurate thermometer. Place the probe and thermometer in the thermos and add water heated above the highest temperature required. Set up a BASIC program to continuously monitor the probe counts such as

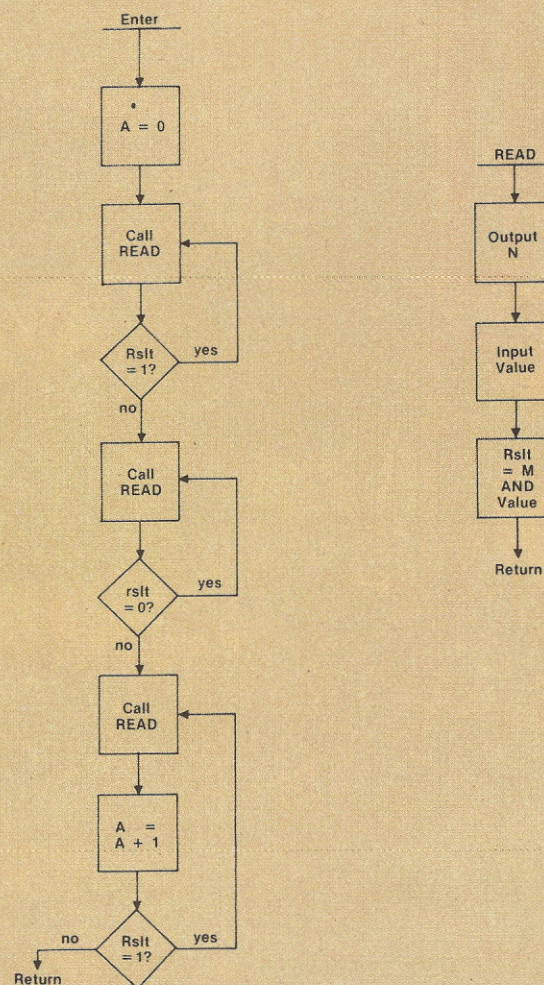


Figure 2. Machine language program.

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```

10 PRINT USR(8000, 255, 64)
20 GOTO 10
30 END

```

As the water cools, note the counts as the temperature passes each calibration temperature. For temperature below room, start with ice water, recording points as it warms up. This calibration procedure yields a table such as:

Temperature °F	A Counts	Calibration Points
		1000
130	1400	
		1600
125	1750	
		1800
120	1900	
		2150
115	2200	
		2350
110	2500	
...
	
		7050
65	7800	
		8000
60	8900	

A word of caution: The numbers obtained depend on the computer, the particular thermistor, and the capacitor used. These numbers are given only as examples; values could vary considerably. Also, once a thermistor and multivibrator combination are calibrated, do not switch them around or re-calibration is necessary.

The numbers in the third column of the table lie approximately midway between the calibration points of the second. These are the numbers entered in the table look-up part of the BASIC program. To see this, note that the program should return with 120° for any value of A between 1800 and 2150. Rounded to 5° accuracy, this is the correct value for any count in this range.

BASIC PROGRAM

The program begins with 43 POKE statements that set up the machine language routine. Unfortunately, my version of BASIC has neither DIMENSION statements and variables, nor DATA statements. For those who do, this part of the program can be considerably shortened. It can also run as a separate program if memory space is short.

The program begins at line 90. Four subroutines are used for each main operation. Two begin at lines 300 and 400 with the calibration data for the two table look-ups.

The short subroutine beginning at line 500 is used to call the machine language program. Each probe is sampled ten times and the average is taken using line 510; this leads to a conversion with higher accuracy. I should point out that my BASIC does not have FOR/NEXT capabilities.

Most of the time, the computer is twiddling its thumbs in the short subroutine beginning at line 1000, a one-hour delay timer. The value of Z determines the time interval between readings and is varied until the interval is correct. The process is somewhat simpler than it may seem if done in a systematic manner. Port 4 in my computer is a hexadecimal LED output port. Line 1002 continuously displays the time remaining before the next reading using this port. This is handy to indicate whether the computer is running correctly or has tied itself up in an endless loop.

SUGGESTED IMPROVEMENTS

This BASIC program is quite simple; many improvements are possible. Measurements could be taken at closer intervals or print out the maximum and minimum temperatures for the day. Another possibility is to control a conventional hot-air furnace. Using suitable controls, the temperature could be reduced during the night; the thermostat setting could be increased using a control program if the outside temperature dropped.

The converter described in Figure 1 will work with any variable resistance and is applicable to a large number of other measurements. A complete weather station could be built around similar circuitry with the necessary hardware. For instance, by fastening a variable potentiometer to a wind vane, wind direction could be monitored.

The program below is in shortened form because many of the statements are applicable only to my system and calibrations. Enough is included for anyone to follow the program and understand the necessary operations. In my BASIC, the LET keyword is optional and has been left out of all assignment statements. □

PROGRAM LISTING

```

2 POKE 8000,211
4 POKE 8001,136
. . . . .
. . . . .
88 POKE 8045,213
90 PRINT "Enter time (hours)",
92 INPUT T
100 N = 255
110 M = 128
120 GOSUB 500
130 GOSUB 300
140 IF C >= 100 N = 247
150 IF C < 100 N = 255
160 M = 64
170 GOSUB 500
175 GOSUB 400
180 PRINT T;" :00", "T(collector) = "; C, "T(room) = "; D,
182 IF N = 247 PRINT "Fan on"
184 IF N = 255 PRINT " "
190 T = T + 1
200 IF T = 25 T = 1
210 GOSUB 1000
220 GOTO 110
300 IF A > 1000 C = 130
302 IF A > 1600 C = 125
305 IF A > 1800 C = 120
310 IF A > 2150 C = 115
315 IF A > 2350 C = 110
. . . . .
. . . . .
300 IF A > 1000 C = 130
365 IF A > 8000 C = 60
370 RETURN
400 IF A > 1000 D = 75
405 IF A > 6400 D = 70
410 IF A > 6700 D = 68
. . . . .
. . . . .
455 IF A > 10300 D = 50
460 RETURN
500 B = 9
505 A = 0
510 A = A + USR(8000, N, M)/10
520 B = B - 1
530 IF B > 0 GOTO 510
540 RETURN
1000 Z = 10152
1001 Z = Z - 1
1002 OUT 4, Z/169
1003 IF Z > 0 GOTO 1001
1004 RETURN
2000 END

```


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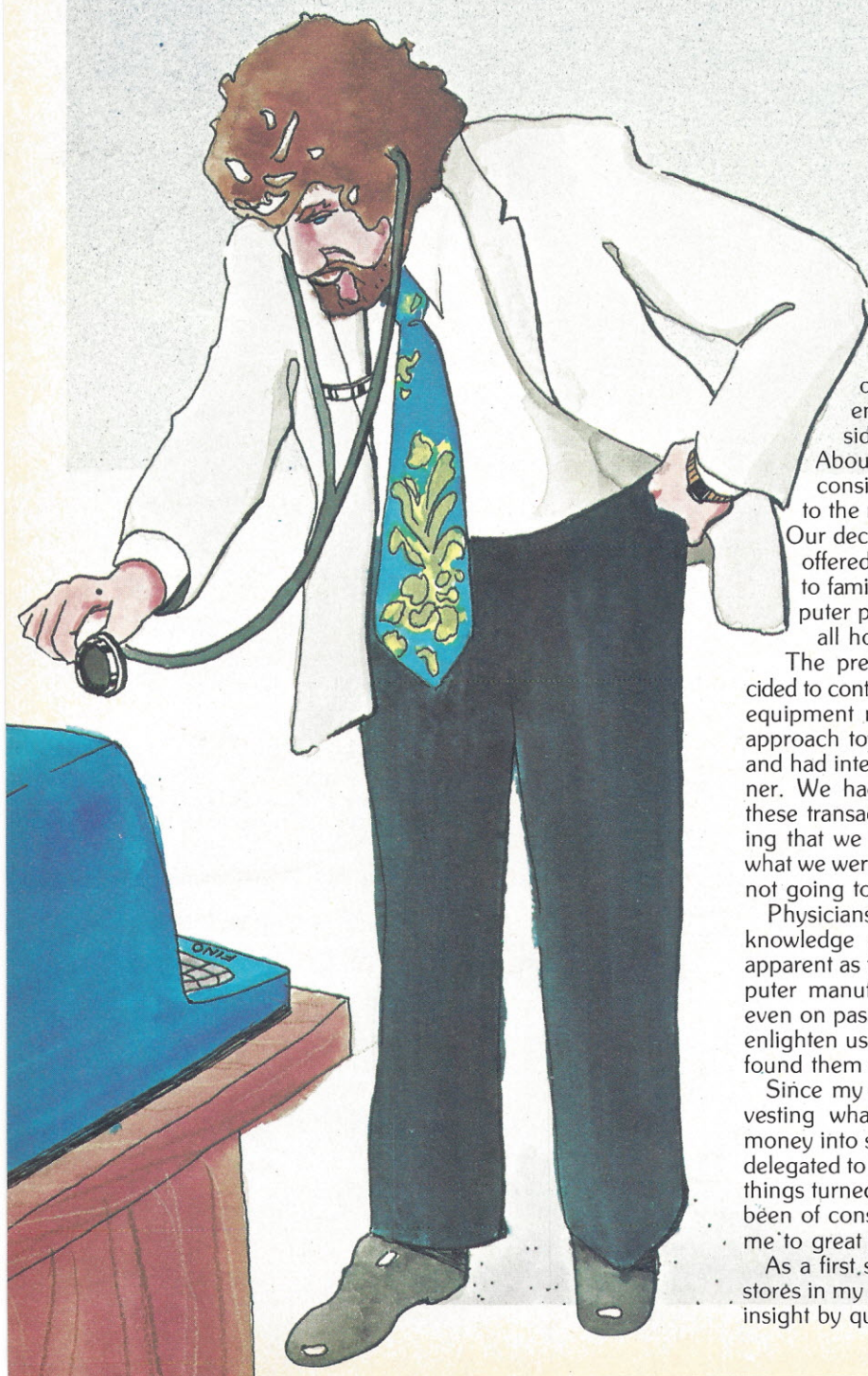
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A Physician's Approach to the Purchase of a Small Office System

By James K. Robinson, M.D.



This article suggests a reasonable approach to the problems faced by the average physician or small business owner, with little or no experience in the computer marketplace, who is considering conversion to a computer system.

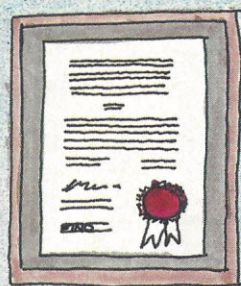
About two years ago, my associates and I began to consider how we might apply computer technology to the running of our three-doctor family practice clinic. Our decision to look into this was the result of a seminar offered by a local hospital. The program was designed to familiarize staff physicians with the large central computer playing a part in the everyday operation of nearly all hospital departments.

The presentation was impressive and it was soon decided to contact several of the major manufacturers of computer equipment nearby to assess our needs. We had used this approach toward the purchase of other medical equipment, and had interviewed architects and builders in a similar manner. We had been reasonably fortunate in consummating these transactions and concluded with the comfortable feeling that we had achieved at least a basic understanding of what we were about. It was soon evident that this method was not going to work with the proposed computer purchase.

Physicians have a reputation for having great gaps in knowledge outside the medical field. This was never so apparent as following our initial interviews with several computer manufacturers, who spoke a language we were not even on passing terms with. Hardware brochures did little to enlighten us since they were printed in the same tongue; we found them unintelligible.

Since my associates were less than enthusiastic about investing what promised to be a considerable amount of money into something we knew next to nothing about, I was delegated to learn about the field and act as an interpreter. As things turned out, my decision to undertake this odyssey has been of considerable value to the clinic, and has introduced me to great personal enjoyment.

As a first step, I paid visits to the home/hobby computer stores in my area. On each successive visit, I was able to gain insight by questioning the sales personnel who took a great



deal of care in helping me choose reading material suited to my level of understanding. Within a reasonable time, I found myself considering the purchase of a personal microcomputer.

The Exidy Sorcerer was the end result of my first phase of study. A succession of amusement and learning programs followed, and I began to feel confident enough to consider a reassessment of our clinic's needs. Sales representatives were invited back to discuss their equipment, but now we were talking the same language.

Several hardware configurations seemed to fit my concept of what was needed currently and for future expansion. Software, on the other hand, presented a problem. By this time, I was convinced that the success of our conversion depended on reliable software and local software maintenance; these did not seem to be available in this area.

By now, my two long-suffering associates had about had it with the entire subject. They admitted they were tired of sitting in on abortive interviews with hard and software vendors who could not, by the widest reaches of the imagination, meet our needs but were willing to try — for a fee. I think my partners were tired of listening to me.

At last, we agreed on criteria that would have to be satisfied before further discussion. One of the most important items was cost justification on the basis of present and projected front office expenses. This was of concern to me since I had anticipated some increase in the cost of billing with an in-house system. I felt the increased efficiency of a computerized accounts receivable handling system justified an increase in billing costs. My partners were not of the same mind, but agreed on the other criteria.

About this time, I discovered a new system that had been designed locally, and was presently up-and-running in several medical offices similar to our own. Careful study suggested that the program, conceived and written to run on an Alpha Micro hardware configuration, was substantially what

we were looking for.

I envisioned our only difficulty in meeting the demand of cost justification. Surprisingly, added up our present billing expenses, including expensive paper products and the cost of photocopying our patient ledgers each month, I met this figure with room to spare. Tax considerations such as depreciation of the equipment and the investment tax credit benefits were frosting on the cake.

Our clinic is now the owner of a new Alpha Micro. Two terminals are available for the front office and more will soon be added to allow access from the clinic laboratory and our consultation offices. When we work out the program I have in mind for patient clinical information data retrieval, I will consider placing a terminal at home to allow me access to patient data by telephone. Ninety megabytes of storage in a Phoenix disk will provide enough room to maintain financial and clinical records now and for some time to come.

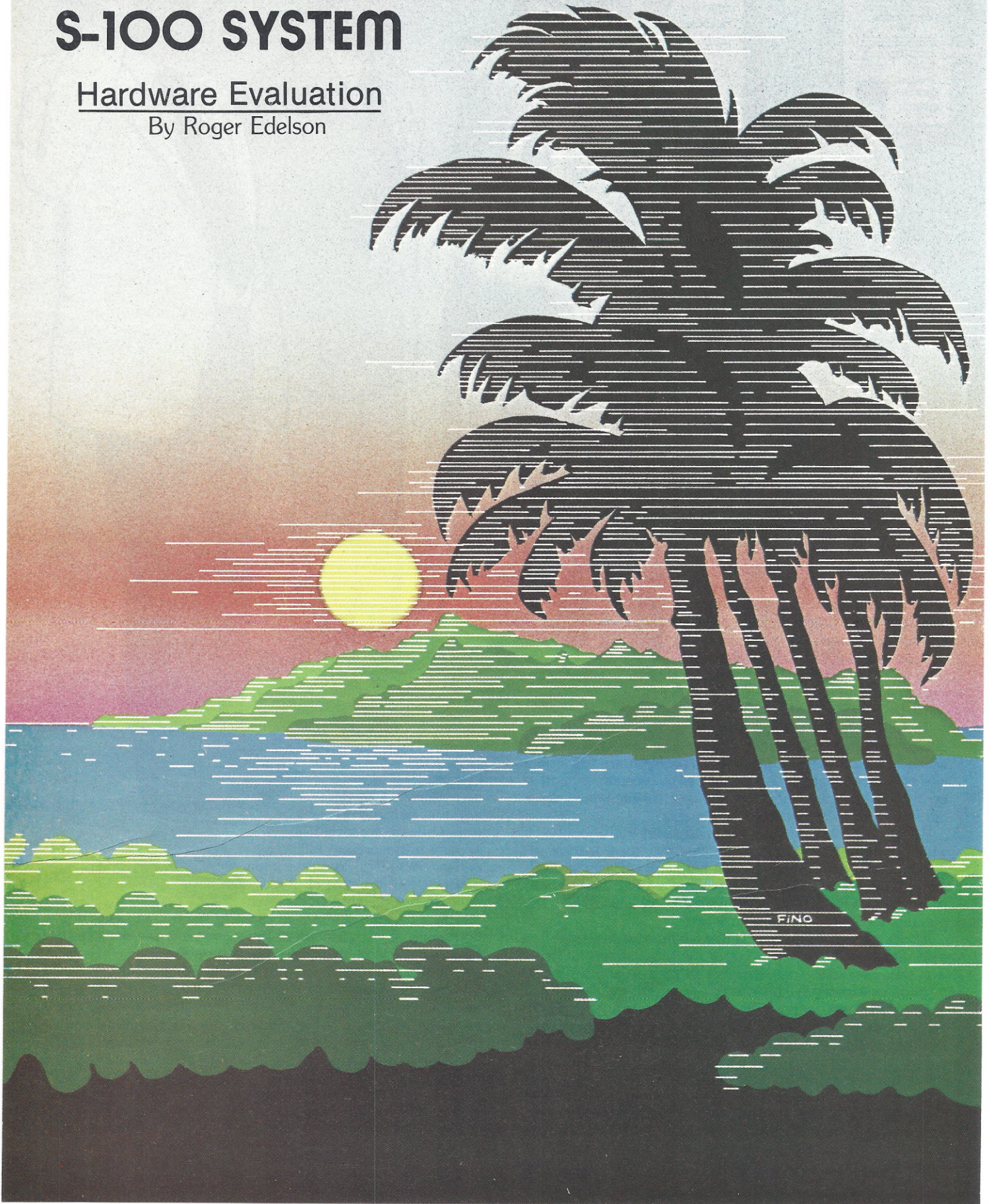
The individual considering the purchase of a computer will do well to undertake a self-study program relating to the

Continued on Page 144

A HIGH-RESOLUTION VIDEO BOARD FOR THE S-100 SYSTEM

Hardware Evaluation

By Roger Edelson



Matrox 256/512 Graphics CRT Controllers

Limited resolution displays with squarish circles and staircase lines can be improved upon with a 256-by-256 or 256-by-512 point display. A graphic controller with this resolution is compatible with the maximum obtainable on a standard TV screen and will allow the production of professional graphic displays. Applications of a high-resolution graphic CRT controller include simulation, curve plotting, and various CAD displays.

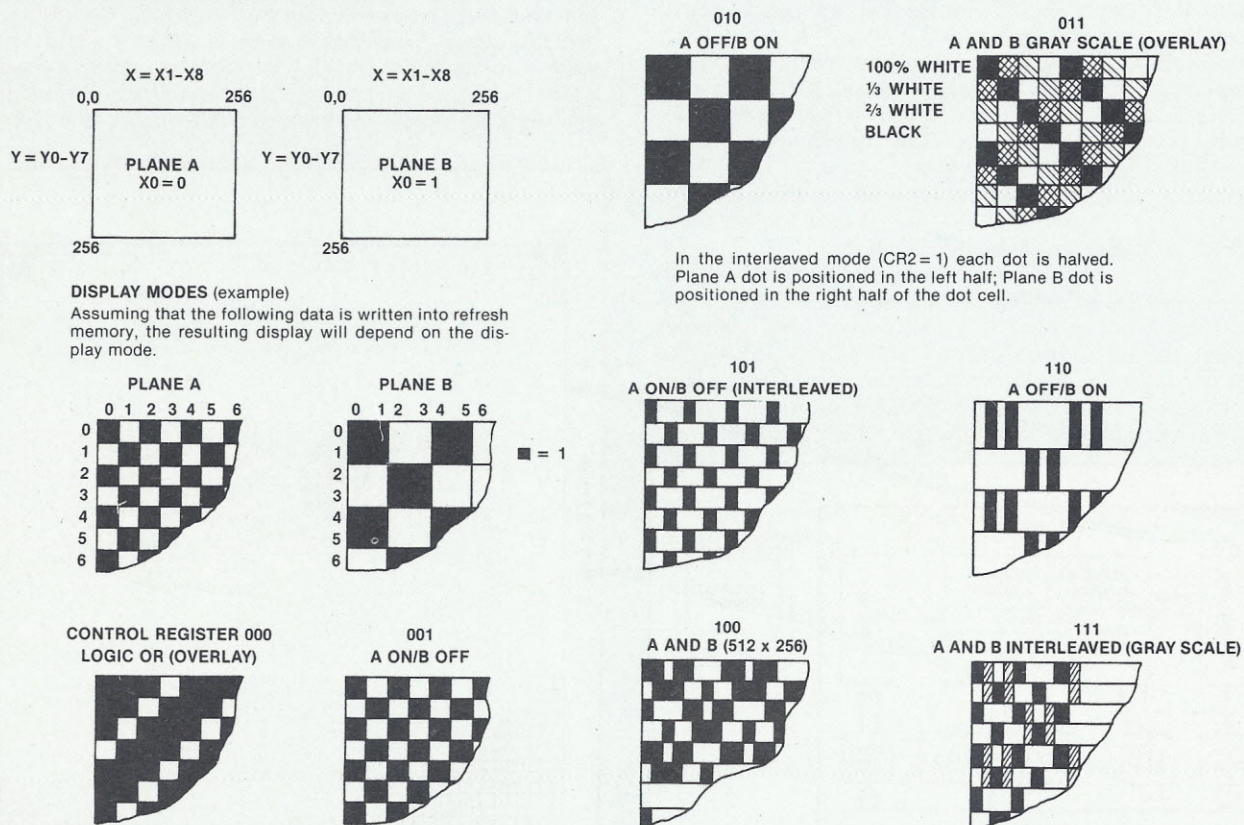
The Matrox line includes two main graphic controller subgroups: the 256 family and the 512 family. Also available is a 24-by-80 alphanumeric controller family compatible with the line of graphic controllers. These families contain boards compatible with all major bus systems — S-100, SBC-80, EXORciser, LSI-11, PDP-11 and STD-BUS. All Matrox graphic controllers are designed so multiple units can be combined for applications requiring a more flexible gray scale or color; or, using the 2480 series, as a combined graphic/alphanumeric display. The boards are available only completely assembled, tested and burned-in with a com-

prehensive manual; software is available separately at a reasonable price.

The ALT-256 is a 256-by-256 high resolution graphics card designed to plug directly into any S-100 bus system. The board contains all interface electronics, a TV sync generator, and its own 64K one-bit dynamic memory with built-in refresh. The on-board refresh memory allows much greater flexibility and speed, as no CPU time is required to refresh the screen. The ALT-256 board occupies a single S-100 bus slot and is addressed as four output ports and one input port; port addresses are selected by on-board jumpers. Two of the output ports are used to store the X and Y coordinates of the addressed dot and another port controls the state of the one-bit pixel (either on or off). The fourth output port is assigned to provide a single command to clear the screen.

Building on the ALT-256 theme is the far more capable ALT-512 graphic display controller. The display field consists of two 256-by-256-by-1 bit planes. This two plane field coupled with a very flexible control arrangement allows the user to implement eight different display formats under software

Figure 1. Available display formats.



control. The display modes are selected by setting the appropriate bits of the single control register as shown in this table:

1. Plane Register (write only)									
7	6	5	4	3	2	1	0		
-	-	-	-	-	-	-	X0	X0=0 plane A, X0=1 plane B	
2. 7 6 5 4 3 2 1 0									
X	X								
Display Mode									
Graph ON/OFF									
Alpha ON/OFF									
Page/single plane erase									

CR5 is screen/plane erase control bit. When "0", a single plane (determined by X0) will be cleared by writing to clear REG. When "1", entire screen will be cleared.

CR4 is alphanumeric video ON/OFF control. (ON=1). Should be set to "0" unless alpha video is fed to alpha input. Useful when ALT-512 is combined with ALT-2480 alphanumeric 24 x 80 display board.

CR3 is graph video ON/OFF control. (ON=1).

CR0-CR2 is graph display mode control.

210

000 Planes A and B displayed logically OR-ed (overlay)

001 Plane A displayed. B off. (equiv. 256 x 256 x 1) (overlay)

010 Plane B displayed. A off. (equiv. 256 x 256 x 1) (overlay)

011 A and B displayed. (equiv. 256 x 256 x 4 level gray A=2¹;B=2⁰)

100 A and B displayed interleaved (equiv. 512 x 256 x 1)

101 Plane A displayed. B off (interleaved).

110 Plane B displayed. A off (interleaved).

111 A and B displayed. (interleaved with A=2¹;B=2⁰ intensity)

Display mode control by software is a powerful feature which allows the user a variety of video effects. Planes A and B are independent and can be written in or read out. Plane register can be assumed to be plane selection register or X0 coordinate if a 512 x 256 display is used.

Overlay means that Planes A and B are displayed one over the other. Interleaved means that Plane B is shifted horizontally one to the right (X0=1).

Figure 1 illustrates the different display formats available under software control. These formats range from two independent 256-by-256 by single-bit pixel planes to a 256-by-256-by-4-gray level pixel display. For applications requiring color or a finer gray scale, up to 24 bits per pixel may be obtained by using multiple boards. Three boards are sufficient for a 512-by-256-by-8 color system.

In order to ease the timing constraints on the CPU and prevent visible interference on the display screen, the ALT-512 contains an on-board 128K by 1 bit (actually 131,072 bits) dynamic memory with built-in refresh. The card also contains an on-board sync generator and all interface circuitry. Control of the ALT-512 graphic CRT controller is through six output ports with two input ports provided to read pixel status and the flag register (for blanks and a light pen). The ALT-512 continues to provide the single instruction full screen (or single plane) erase which was successful

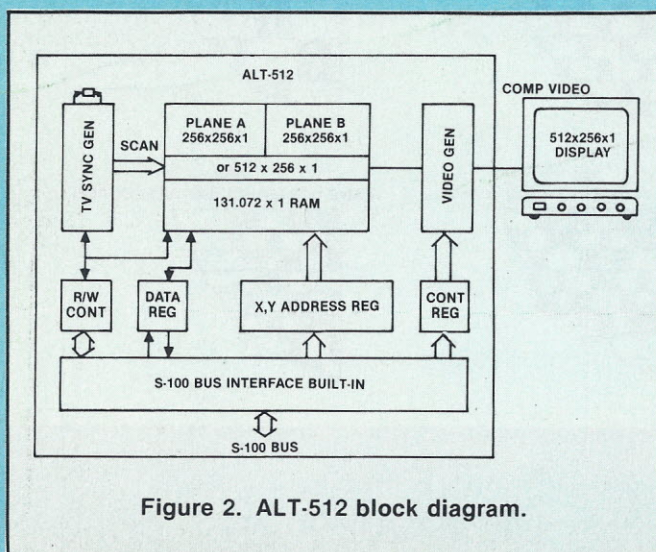


Figure 2. ALT-512 block diagram.

in the Matrox 256 line. However, the ALT-512 is significantly faster than the earlier models, requiring only 1.4 μ sec access time. This decreased display access time allows the ALT-512 to work with any 8080, 8085, Z80 (or equivalent) at either 2 or 4 MHz clock rates.

The organization of the ALT-512 is quite straightforward as shown in Figure 2. The unit consists of several main sub-units essentially designed to store and retrieve information from the 128K by 1 bit memory. A TV sync generator consists of an 11 MHz oscillator which drives the chain of vertical and horizontal counters. These counters generate all the TV sync and scan signals as well as the necessary refresh controls.

A video generator converts the data stored in the on-board memory into a variety of video signals depending on the contents stored in the control register. The TV sync signals are also combined in the video generator circuitry to produce the composite video output. Provision is made for jumper selection of either American or European standard sync. In the American standard only, the first 240 lines are displayed, although all 256 lines are available for read/write.

The S-100 bus interface electronics provides all the necessary registers, latches, and address and function decoders necessary to properly operate with S-100 criteria. A socket-jumper arrangement allows the eight contiguous ports of the ALT-512 to be placed within the I/O address space as desired by the user. The socket allows programming of address bits A3 through A7 (A0 through A2 selects the desired port).

Registers connected to the S-100 bus data output lines serve as the X and Y address registers during data write. These address registers are multiplexed with the TV scan address for refresh. This X-Y addressing scheme provides the user with a method to address individual dots and also simplifies line drawing. A horizontal or a vertical line requires only one address to be updated for each new dot. The display coordinate system for planes A and B is shown in Figure 1; this system conflicts with the standard display coordinate system given in the software package shown in Figure 3. The difference appears to be in the location of the origin of the X-Y axis.

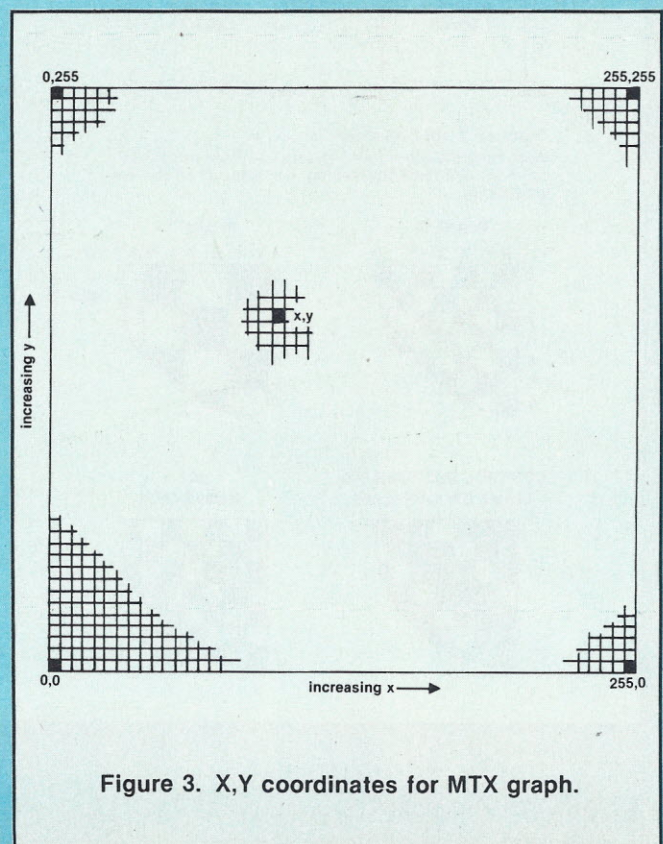
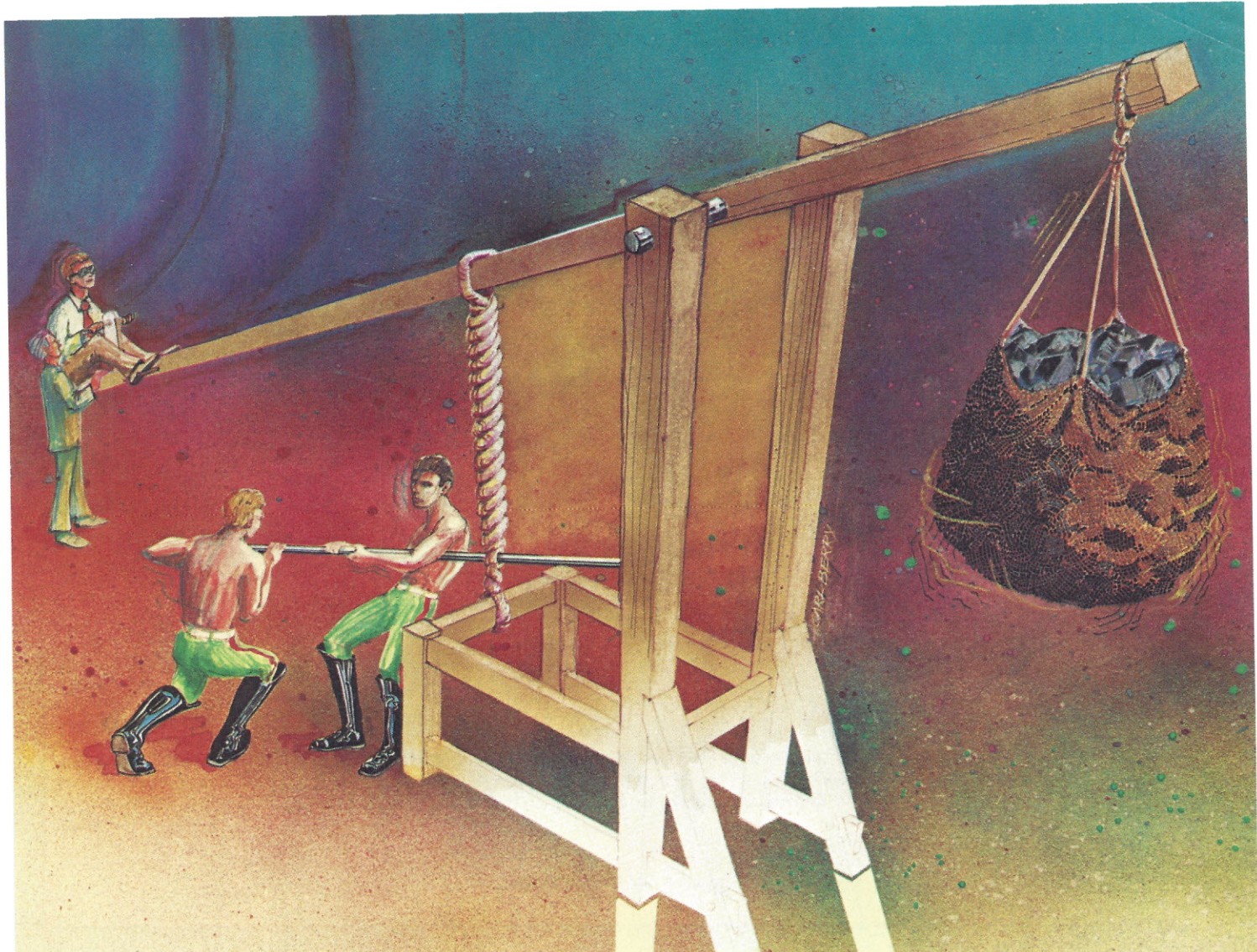


Figure 3. X,Y coordinates for MTX graph.



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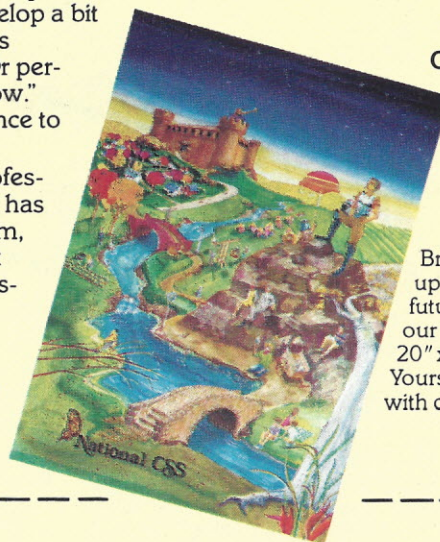
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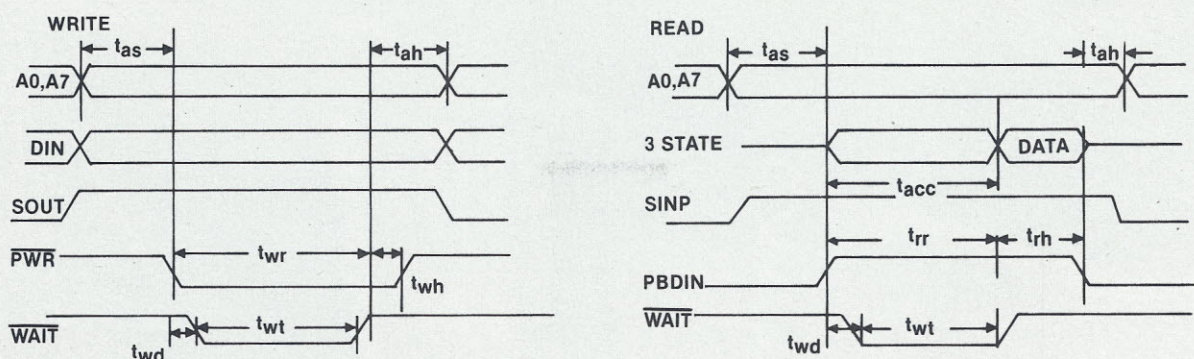
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		MIN	MAX
Address, data set up time	= t_{as}	20	—
Address, data hold time	= t_{ah}	10	—
Wait duration time	= t_{wt}	750	2,150
Write hold time	= t_{wh}	0	0
Write pulse width	= t_{wr}	TWT	—
Wait pulse delay	= t_{wd}	20	50

		MIN	MAX
Address set up time	= t_{as}	20	—
Address, data hold	= t_{ah}	10	—
Wait duration time	= t_{wt}	750	2,150
Read hold time	= t_{rh}	0	0
Read pulse width	= t_{rr}	TWT	—
Wait delay	= t_{wd}	20	50
Read access time	= t_{acc}	TWT	—

The read/write cycle for the ALT-512 starts with \overline{PWR} or $SINP$ leading edge (address and data bus have to be stable). The ALT-512 will respond with a \overline{WAIT} LOW signal which has a duration of 750 nsec minimum and a maximum of 2.15 usec. During \overline{WAIT} LOW, all signals should be stable. In a read cycle, \overline{DOUT} is valid after \overline{WAIT} returns high.

Figure 4. ALT-512 timing.

The software package, MTXGRAPH, separately available, provides seven subroutines for these user programs:

1. INITG — Initialize the graphics software subsystem to standard defaults.
2. PAGE — Next page, i.e., erase the entire screen.
3. CURSOR (X,Y) — Position the cursor at the point X,Y.
4. DOT — Set the point (or points if in a lower resolution mode).
5. LINE (X,Y) — Set the DOTs along the line connecting the current cursor position to the point X,Y to the currently selected color. Leave the cursor set to X,Y.
6. CHAR (VAL) — Display the character whose ASCII value is VAL at the current cursor position using the currently selected color. Leave the cursor at the next character position. Control characters provide for setting the current color, selecting fixed or proportional character spacing, setting DOT size, and all carriage controls.
7. ANIMAT — Pause until the start of the next vertical blanking period.

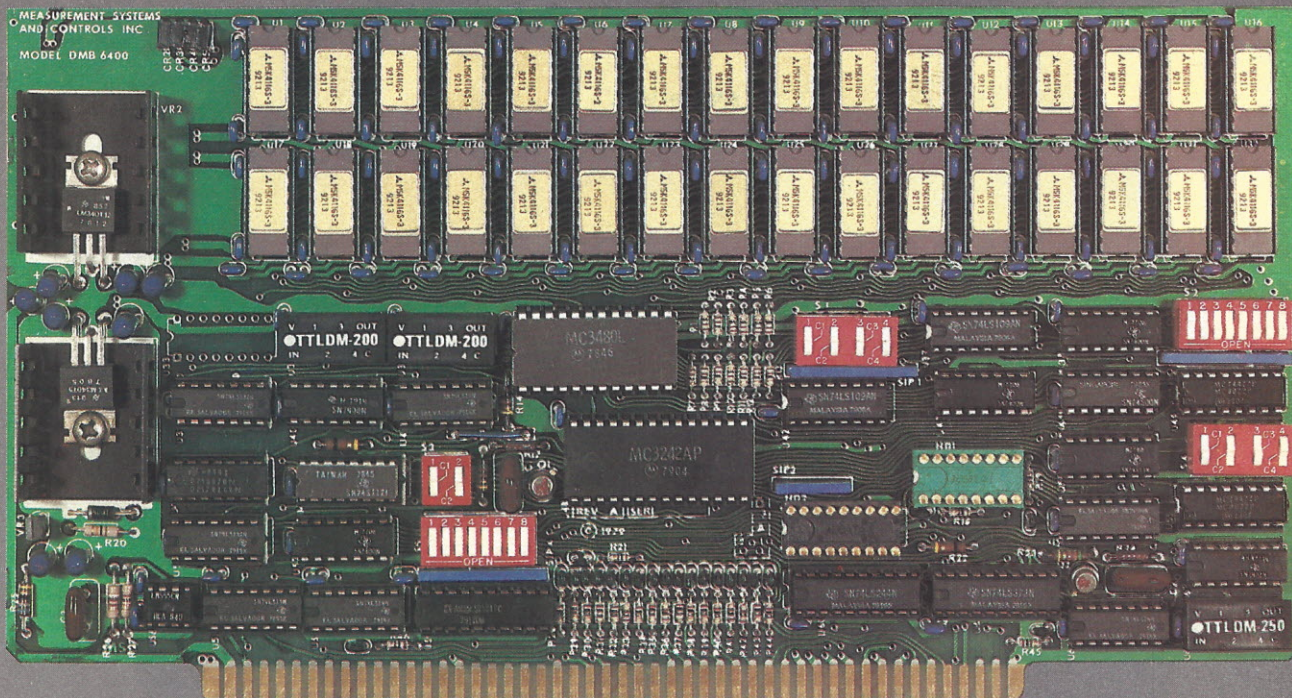
The board is well made with fully screened and masked circuit traces and gold-plated edge connectors. Texas Instruments' 300 nsec TMS 4116 dynamic memory ICs are used as the on-board storage for the video data. This on-board memory is cost effective. Otherwise, the user would need to provide 16K of 8-bit bytes out of the CPU memory space and would also have to keep track of the video information in each byte. The memory chips are fully socketed for ease of maintainability, as these ICs are the ones most likely to fail.

Because of the industry-wide shortage of low-power-Schottky logic, some of the devices on the board were standard TTL instead of the called out LS. Where these ICs were used, sockets have been provided to allow the user to replace the standard devices with LS when they become available. There is no operational penalty associated with the use of the standard logic other than a slight increase in power consumption.

The circuit design of the Matrox ALT-512 is comparable with most S-100 boards from reputable sources. The ubiquitous double gate crystal oscillator is used to provide the on-board 11.06688 MHz clock. I would like to see a real stable oscillator design used; though for most computer usages this design is more than adequate.

The bus interface timing shown in Figure 4 is compatible with the proposed IEEE S-100 standard, although it will not support 16-bit systems. The data bus is directly connected to two LS273s and one LS174 which could cause some loading problems in a fully-developed S-100 system using a number of these boards to obtain multiple bit gray-scale or color. In fact, with this design, the card violates the proposed IEEE card-level bus loading specification stating that a single card may not source more than 9.5 mA at 0.5 volts. In most systems, this bus loading will not be a problem to the user; to be fair to Matrox, the card was designed well before the proposed IEEE standard was published.

Considered in light of the capabilities and performance of the ALT-512, these quibbles are minor. The board produces graphics with exceptional resolution and clarity. The capability to store two separate frames, updating one while displaying the alternate frame, allows the production of professional-like animation effects. □



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CIRCLE INQUIRY NO. 8

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System of the Month

MicroDaSys millie

By Tom Fox

In a business where computer names are so similar as to be nearly indistinguishable from one another, we must overlook the occasional advertiser's penchant for assigning "cute" names to their companies and/or products. MicroDaSys is a contraction of Micro Data Systems, and you're sure to pronounce it wrong on the first three attempts. Try "micro-daisies" and you've got it. The term "millie" is harder to track down, but has something to do with coining a new prefix for computer sizes. First there were computers, then minicomputers, followed by microcomputers, and finally milicomputers; except that only MicroDaSys makes the true millie computer. No explanation as to why the product name doesn't contain a single uppercase letter.

Just as a daisy by any other name remains a flower, an S-100 bus computer with Z80 processor and CP/M operating system is a fairly common entity these days; and the millie machine itself is little more (or less) than simply that. To a student of the current crop of small business-oriented microcomputers, the hardware bits which make up a millie are plain-vanilla conventional, and the software programs are largely available from many sources other than MicroDaSys.



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CIRCLE INQUIRY NO. 4

So why do we single out the millie as worthy of analysis? Three reasons, really:

1. The manufacturer has zeroed in on one area in which a computer can help small business (word processing), and has optimized the machine to handle that chore without compromise—even though more traditional computer tasks are still performed handily.
2. MicroDaSys has done a far better than average job of studying the field of publicly-available applications programs, and has carefully integrated the best of them into a well thought-out package showing little of the patchwork approach evidenced by other computer/program assemblages.
3. The company management has organized a unique way of marketing millie's charms. And *you* are offered a piece of the action.

By now, you are probably getting the feeling that MicroDaSys is a company with strong marketing savvy. In contrast with others who have invented supremely clever and useful products—only to flounder because of inexperience in the art of selling—we see here a management team which believes that converting a looker into a buyer is of overriding importance—far more critical, say, than merely making a superior computer. It's the American way, and it works. But it won't work unless the product is at least serviceable, so let's look at the assets of the millie.

HARDWARE

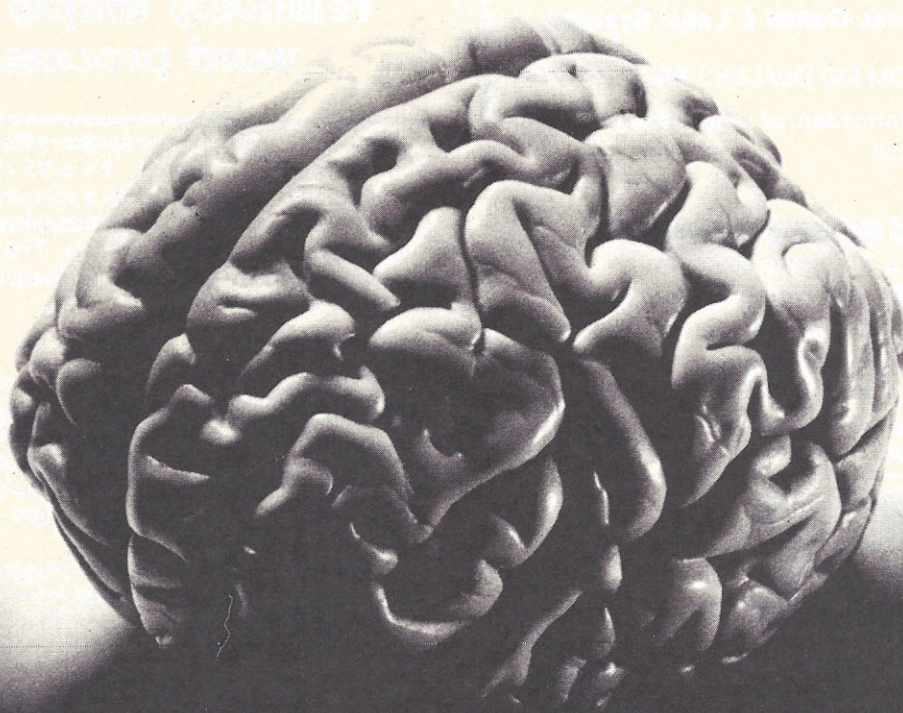
The basic millie is delivered in three pieces: a mainframe box containing the computer and a pair of flexible disk drives, a video terminal with keyboard, and a hard-copy printer. Its list price is \$7695. A single disk drive version sans printer is available for \$3995, but we wouldn't recommend such a configuration for any serious business application. These prices, incidentally, include just one piece of software: the CP/M operating system. Everything else—even BASIC—is tariffed separately. MicroDaSys' System-Z is millie's precursor; the only essential hardware difference being the earlier system had no video terminal, but depended upon the printer's keyboard and a bought-out TV monitor for the primary human/machine interface.

The mainframe box contains a six-slot S-100 motherboard into which the active system cards are plugged. This includes a Z80-based central processing unit (CPU) card, random access memory (RAM) cards totaling 48 kilobytes of memory space, a controller card for the floppy disk drive, and a video card to drive the cathode ray tube (CRT) terminal. This complement doesn't leave much room for expansion, a limitation not overlooked by MicroDaSys engineers—a single-card CPU with 60 kilobytes of on-board RAM is in the works to free some of the motherboard slots for additional uses.

The CRT terminal is similar to Vector Graphic's "mindless" terminal in that it depends on a video display card plugged into the S-100 slot. This has the advantage that the extremely fast technique of memory-mapped input/output (I/O) can be used. Using memory-mapped I/O, a screen full of characters can be displayed several times faster than by the more common serial I/O technique. The major motivation for using memory-mapped I/O in the millie is that the Electric Pencil word processing program requires such a capability. One of the disadvantages of memory mapping the CRT display is that some 2000 bytes of memory space must be used, making it unavailable for programs or data.

The floppy disk drives are full-size eight-inch units sporting double-density packing of the data in standard IBM format. A total of one megabyte (one million characters) of data can be stored online with the two drives, and another pair can be added in the future to double that capacity. If your appetite for storage

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CIRCLE INQUIRY NO. 2

space exceeds those bounds, you can opt for either a 30- or 90-megabyte hard disk drive. The one chosen is Control Data's Phoenix series, which features a removable cartridge storage medium. This means the system does not necessarily have to be equipped with floppy disk drives in addition just to make backup copies of the data stored on the hard disk unit. Hard disk drives remain among the most expensive of options. Plan on spending a minimum of \$12,500 for the 90-megabyte system.

Many millies will doubtless make their marks while using all their time performing the relatively simple task of word processing.

The only available printer for the millie is the excellent Nippon Electric Co. Spinwriter. It's a 55-character per second fully-formed character unit with a spinning plastic thimble doing the work performed by a daisywheel on the otherwise similar Diablo and Qume printers. The Spinwriter supplied with the millie is the read-only (RO) version, which means a keyboard is not included.

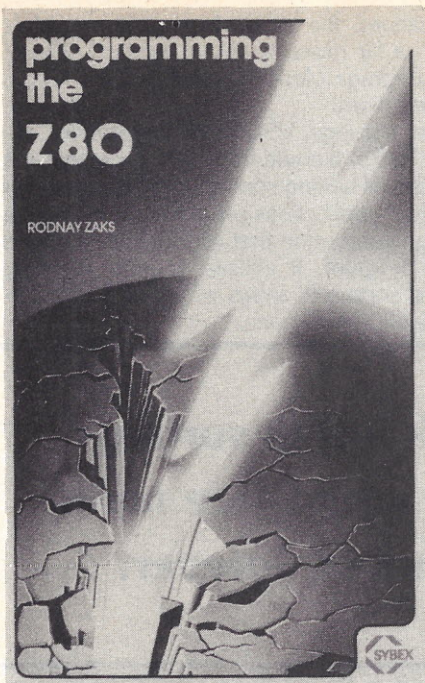
SOFTWARE

Every program which runs on the millie does so under Digital Research's CP/M disk operating system, including the only available BASIC language, CBASIC II (\$100). After experimenting with others, MicroDaSys is putting their money on this pair as becoming a defacto standard in the microcomputer world during the next several years. It's a pretty safe wager on their part.

The most important applications program on the millie is the word processor. Here, MicroDaSys is hedging their bet by offering two: Michael Schroyer's classic Electric Pencil (\$275) and the more recently born Word Star (\$495). Both feature screen-oriented two-dimensional text entry and effective means to take advantage of the Spinwriter's trickiest features: underlining, bold face type and pseudo-proportional letter spacing for eye-pleasing justification of the right-hand margin. MicroDaSys has added the simple but elegantly effective twist of color coding the terminal keyboard to help you memorize the many control characters needed to make these programs dance. We expect this trick to be flagrantly copied.

The MicroDaSys catalog lists a pair of programs that enhance the word processors by adding automatic form letter generation capabilities. The Pencil Sharpener and Star Brightener list for an additional \$195 each.

Many millies will doubtless make their marks while using all their time performing the relatively simple task (for a computer) of word processing. However, the factory has hardly neglected the more usual financial haunts of business computers. The MicroDaSys MicroIntegration series of accounting programs is a judicious selection of modules which have been married with the typical small business user in mind. The package has accounts payable, accounts receivable, payroll with cost accounting, general ledger, order entry and inventory. The millie makers have enhanced these programs with additional linkages between the various data structures embodied by the programs, and have tacked on a word processing-like data entry module. This latter capability adds eight separate control keys (insert and delete characters, etc.) to the simple backspace to ease the job of editing data while entering it. The six programs listed can be included with millie for \$195 each.



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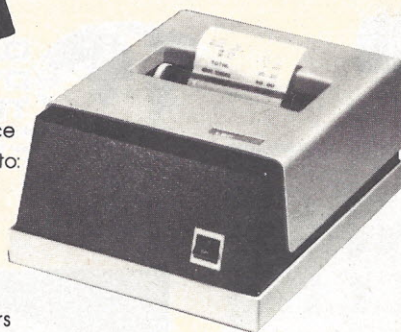
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A slick utility sorting package could free millie programmers forever. . .

We have included prices for the above-listed software programs to give a feel for the level of investment involved in this "invisible" asset. A substantial cost segment can easily be tied up with programs—even if you forego the generally more expensive route of purchasing customized software. Software, like gasoline, is increasing in cost a great deal faster than the vehicles they feed.

MARKETING

We come now to the real reason for millie's distinctive position. The way it is being sold. Whereas the bulk of the competition devotes a major portion of their marketing budget to search for or set up "qualified" retail dealers, the millie marketers are going straight to the grass roots—that's you, my friend, if you want to play. Many computer manufacturers recall with chagrin their earlier days, when computer-knowledgeable troops were in even shorter supply than they are today, and anyone with the price of a single system could call themselves a dealer. Experiences with these outlets were generally so traumatic that the first order of business was to weed out the worst.

MicroDaSys vows never to perform such unpleasant surgery, and emphasizes that technical qualification should be the least of your concerns if you choose to become a millie dealer. Here's how to do it:

Declare your intentions by filling out a one-page information sheet and mailing it to MicroDaSys. Presto, you're a millie dealer. Sell a system to a friend (or buy one for yourself) and pocket a 15% commission—up to 25% if you sell several at once. Similar "discounts" apply to peripherals and software products. MicroDaSys will send you sales leads generated in your neighborhood through their national advertising. Other income opportunities can come from selling service contracts to millie users. You set the prices but have to finance a stock of spare parts. Finally, you can earn by performing custom programming services for your millie customers. (If the factory refers such business to you, they rake off 25% of your hourly rate.)

Sound too good to be true? It may be—but then, it may be too good an opportunity to miss. Many people have risen to the bait; the list of millie "dealers" is many times longer than the number of millies manufactured so far. We predict that not many millies will be sold at list price in an environment where every self-reliant computer hack qualifies for a discount. We are by no means endorsing the effort, only fascinated by its boldness. It appears to be a deliberate incitement to chaos in an industry just beginning to show the glimmerings of organization. □

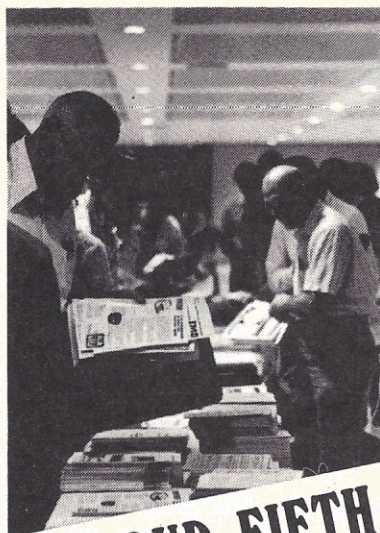
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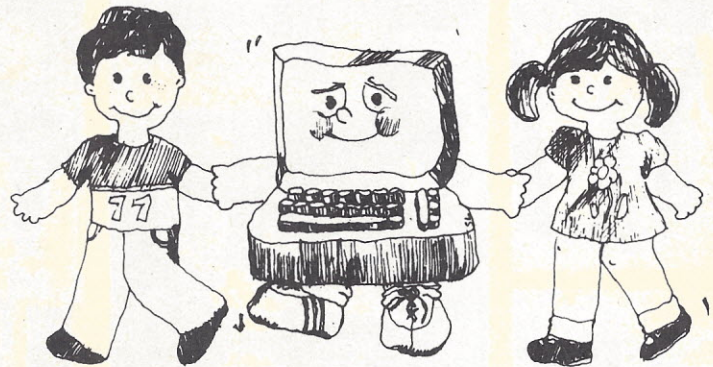
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When I Teach Kids How to Use It



By Bob Albrecht

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This is a continuing series for parents and teachers who wish to help kids learn how to use, program and enjoy the Radio Shack TRS-80 computer. Parts 1 through 3 are available free as an eight-page booklet from Radio Shack. Write Sharon Ross, Radio Shack Circulation Dept. 3, 1300 One Tandy Center, Fort Worth, TX 76102.

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If she reaches an edge of the oasis, she ventures not into the desert. Instead, she remains in the oasis, seeking more cosmic dust, consuming it, gathering strength for a leap through hyperspace—hopefully, to another oasis.

```
100 REM***WANDERING STAR #3
110 CLS
200 REM***COSMIC DUST
210 FOR K = 1 TO 200
220 PRINT @ RND(1022), " ";
230 NEXT K
300 REM***WANDERING STAR APPEARS
310 ROW = 7
320 COL = 32
330 PRINT @(64*ROW + COL), "***";
400 REM***WANDERING STAR RESTS
410 T = 2000
420 FOR Z = 1 TO T : NEXT Z
```

```
500 REM***WANDERING STAR WANDERS
510 PRINT @(64*ROW + COL), " "; She leaves her old
520 W = RND(4) place
530 IF W = 1 THEN ROW = ROW + 1 She might go down
540 IF W = 2 THEN ROW = ROW - 1 She might go up
550 IF W = 3 THEN COL = COL + 1 She might go right
560 IF W = 4 THEN COL = COL - 1 She might go left
```

```
600 REM***KEEP HER ON THE SCREEN
610 IF ROW < 0 THEN ROW = 0
620 IF ROW > 15 THEN ROW = 15
630 IF COL < 0 THEN COL = 0
640 IF COL > 63 THEN COL = 63
650 IF ROW = 15 AND COL = 63 THEN COL = 62
700 REM***SHOW HER IN HER NEW PLACE
710 PRINT @(64*ROW + COL), "***";
720 T = 100
730 FOR Z = 1 TO T : NEXT Z
740 GOTO 510
999 END
```

Wandering Star will stay on-screen. . .er, that is, in the cosmic oasis. This is insured by lines 610 through 640. If ROW should become less than zero, line 610 will bump it back to zero. If ROW should become more than 15, line 620 bumps it back to 15. Lines 630 and 640 do similar things for COL. Sometimes, Wandering Star will seem to hover on the edge of the oasis, then move away. Line 650 prevents Wandering Star from occupying position 1023 (ROW = 15, COL = 63), which would cause everything on the screen to scroll up one line. We don't want that to happen. The oasis remains on place; only Wandering Star wanders.

WANDERING STAR VARIATIONS

Change lines 600 through 640 as follows.

```
600 REM***IF SHE GOES OFF-SCREEN, LET HER
    WANDER
610 IF ROW < 0 THEN 520
620 IF ROW > 15 THEN 520
630 IF COL < 0 THEN 520
640 IF COL > 63 THEN 520
```

What will happen if you make this change? Try it and find out. If she goes off-screen, wait for awhile; maybe she will return. We suggest that you run this variation several times. Be patient each time.

Here are some other ways to do lines 520 through 560.

*Use ON. . .GOTO. . .instead of IF statements.

```
520 ON RND(W) GOTO 530, 540, 550, 560
530 ROW = ROW + 1 : GOTO 610
540 ROW = ROW - 1 : GOTO 610
550 COL = COL + 1 : GOTO 610
560 COL = COL - 1 : GOTO 610
```

*Use ON. . .GOSUB. . .instead of IF statements.

```
520 ON RND(W) GOSUB 530, 540, 550, 560 : GOTO
    610
530 ROW = ROW + 1 : RETURN
540 ROW = ROW - 1 : RETURN
550 COL = COL + 1 : RETURN
560 COL = COL - 1 : RETURN
```

*Here is a completely different way to make Wandering Star wander.

```
520 A = RND(3) - 2      Or, you can do this in
530 ROW = ROW + A      one statement!
540 B = RND(3) - 2      Or, you can do this in
550 COL = COL + B      one statement!
```

YOUR TURN

- Make Wandering Star blink on and off as she wanders.
- Design an entirely new way to do lines 510 through 560 and lines 610 through 640. That is, think up a different way to cause Wandering Star to wander, yet stay in the cosmic oasis.
- Create your own Wandering Star adventure. It could be a program to show Wandering Star how to do something. It could be an idea for someone else to use in a program. It might be a story about Wandering Star. If you do this, please share it with us. Send your program, story, idea or whatever to: Wandering Star, P.O. Box 310, Menlo Park, CA 94025.

SELECTED SHORT SUBJECTS*

Try these little programs with kids. If someone asks, explain how and why the programs work.

```
100 REM***ONE STAR TWINKLING
200 REM***TWINKLE ON
210 CLS : PRINT @472, "****";
220 GOSUB 510
```

*Portions of this section are excerpted from *TRS-80 BASIC: A Self-Teaching Guide* by Bob Albrecht, Don Inman and Ramon Zamora, copyright 1980 by John Wiley and Sons, Inc.

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CIRCLE INQUIRY NO. 38

```
300 REM***TWINKLE OFF
310 CLS
320 GOSUB 510
400 REM***GOTO 'TWINKLE ON'
410 GOTO 210
500 REM***RANDOM TWINKLE TIME
510 T = RND(1000)
520 FOR Z = 1 TO T : NEXT Z
530 RETURN
999 END
```

The Twinkle Time can vary from almost nothing to a couple of seconds. Try this: change line 510 to

```
510 T = RND(RND(1000))
```

The following program will put 100 stars in random places on the screen, then twinkle them.

```
100 REM***TWINKLE, TWINKLE LOTS OF STARS
110 DIM S(100)
200 REM***PUT RANDOM POSITIONS IN ARRAY, S
210 FOR K = 1 TO 100
220 S(K) = RND(1022)
230 NEXT K
300 REM***TURN ON STARS AT S(1) THROUGH
    S(100)
310 FOR K = 1 TO 100
320 PRINT @ S(K), "***";
330 NEXT K
400 REM***TWINKLE A STAR PICKED AT RANDOM
410 R = RND(100)
420 PRINT @S(R), " ";
430 FOR Z = 1 TO 50 : NEXT Z
440 PRINT @S(R), "***";
450 GOTO 410
```

GAMEMASTER'S DICE

Have you heard of Dungeons and Dragons, Runequest or Tunnels and Trolls? These are fantasy role-playing games. If you are a teacher and haven't heard about these games, ask your students about them. In the unlikely event that they can't fill you in, write to the following companies for information.

Dungeons and Dragons (D&D) from TSR Hobbies
P.O. Box 756, Lake Geneva, WI 53147

Runequest (RQ) from The Chaosium
P.O. Box 6302, Albany, CA 94706

Tunnels and Trolls (T&T) from Flying Buffalo, Inc.
P.O. Box 1467, Scottsdale, AZ 85252

To play any of these games, you must create one or more characters, then guide your character(s) through adventures in a universe created by a game master. To create a character, you will roll three six-sided dice several times. We will use Runequest as an example.

A Runequest character has seven characteristics: strength (STR), intelligence (INT), power (POW), constitution (CON), dexterity (DEX), charisma (CHA) and size (SIZ).

These characteristics determine a character's ability to use weapons, fight, learn and use magic, sustain damage, lead others, and so on.

Each characteristic is determined by rolling three six-sided dice. So a characteristic can range from a low of 3 to a high of 18.

Here is a program to create a Runequest character.

```

100 REM*** CREATE A RNEQUEST CHARACTER
110 CLS
200 REM*** EACH 'DICE' IS SUM OF THREE DICE
210 GOSUB 310 : PRINT "STR", DICE
220 GOSUB 310 : PRINT "INT", DICE
230 GOSUB 310 : PRINT "POW", DICE
240 GOSUB 310 : PRINT "CON", DICE
250 GOSUB 310 : PRINT "DEX", DICE
260 GOSUB 310 : PRINT "CHA", DICE
270 GOSUB 310 : PRINT "SIZ", DICE
280 PRINT
290 STOP
300 REM*** SUBROUTINE TO ROLL 3 DICE
310 D1 = RND(6)
320 D2 = RND(6)
330 D3 = RND(6)
340 DICE = D1 + D2 + D3
350 RETURN
999 END

```

Let's roll a character. We type RUN, press ENTER and. . .

```

STR      15
INT       7
POW       9
CON      12
DEX      10
CHA      11
SIZ      13
BREAK IN280
READY

```

We have our first RQ character. He is big (SIZ=13), strong (STR=15), above average in soaking up damage (CON=12) and has average dexterity (DEX=10). He is also not too bright (INT=7) and has below average power (POW=9). He will *not* become a magic user. Looks like our character would be a good soldier.

To roll another character, type RUN and press ENTER.

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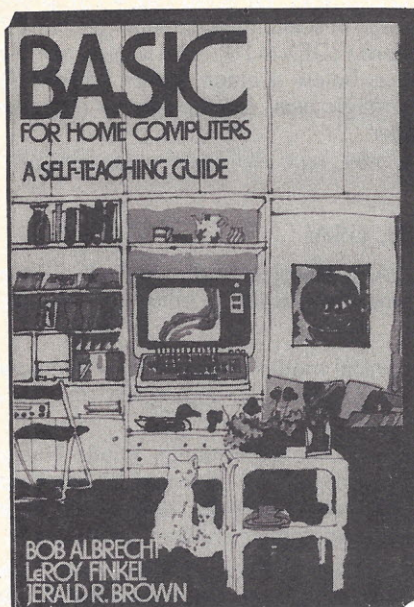
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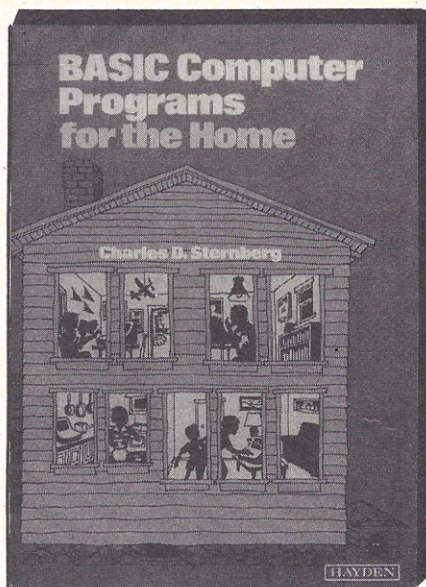
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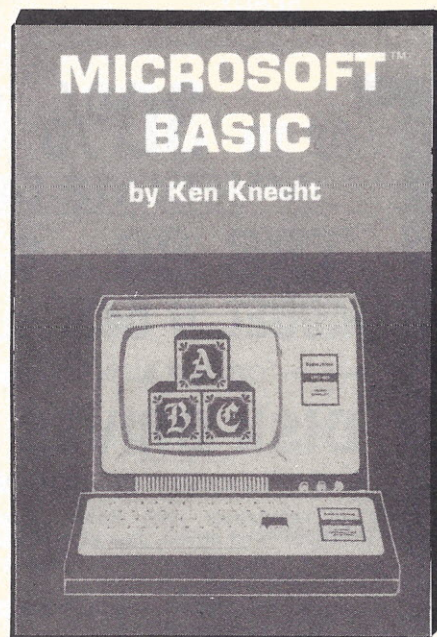
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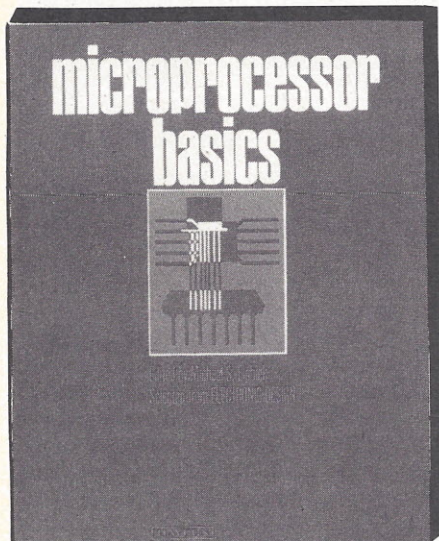
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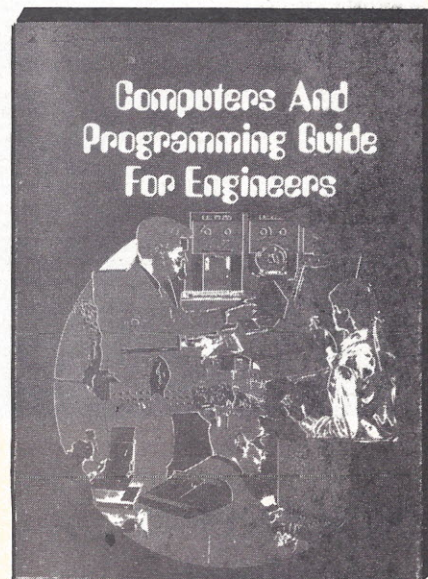
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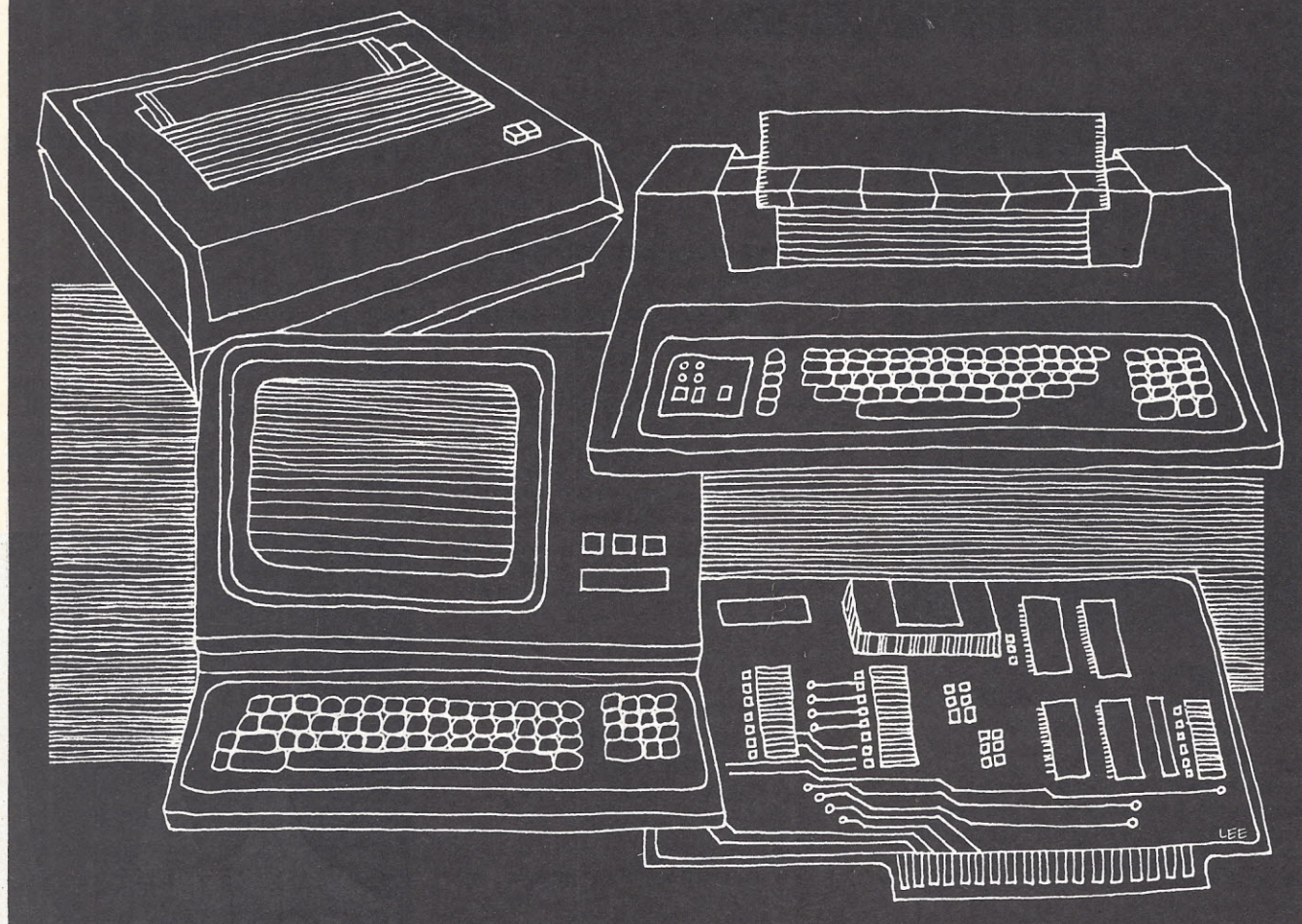
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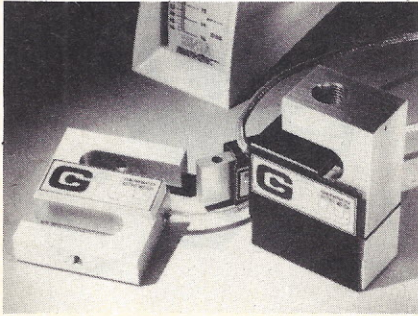
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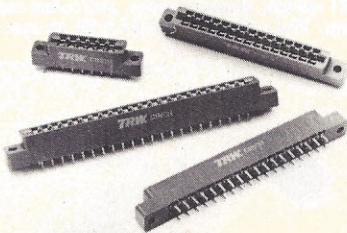
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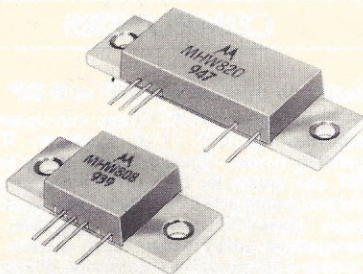
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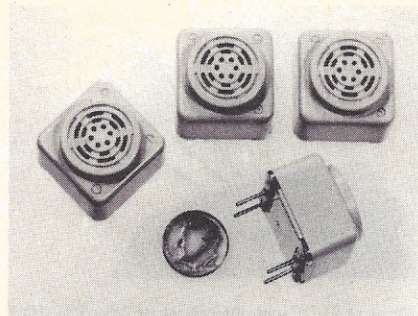
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16-Key Pad Package

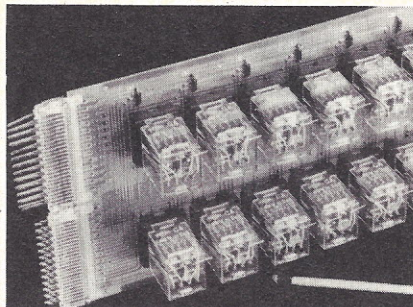
Microcomputer Technology Inc. has released a numerical key pad kit for the TRS-80. The 16-key pad is for accounting or large-volume numerical entries. Keys include 0 through 9, (-),



(/), (.), backspace and enter key. The unit is completely wired and comes with instructions, key pad, cable and a plastic overlay. Contact: Microcomputer Technology Inc., 2080 S. Grand, Santa Ana, CA 92705. **CIRCLE INQUIRY NO. 135**

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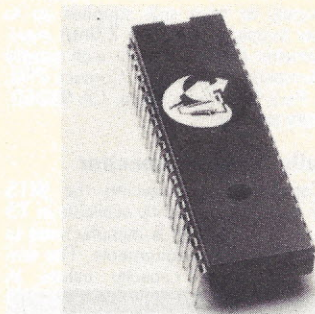
A series of miniature industrial relays with a dielectric strength of 2500 VRMS has been released by ITT Components. Model GA has four form C contacts, is designed to handle up to 5 amps and is available in AC or DC coil voltage versions, PC board or socket mountable. It has bistable and time delay versions in the same hous-



ing. Applications include instrumentation, medical equipment such as x-ray devices, artificial kidney machines, automation for elevators, urban transport and traffic controls, machine tools and safety subsystems for power plants. Contact: ITT Components, 1551 Osgood St., N. Andover, MA 01845. **CIRCLE INQUIRY NO. 136**

Single Chip Controller

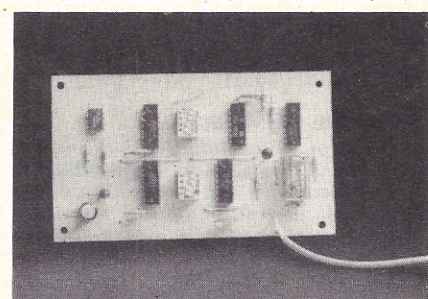
Cybernetic Micro Systems has introduced the CY500 stored program stepper motor controller. The device, N-MOS, is user programmable, executing 22 separate function oriented commands, specified using single letters. The controller can be commanded by a standard ASCII keyboard.



When in the ASCII mode of operation, the instructions form a function oriented high level language. The CY500 can be placed in a binary mode to facilitate computer control using binary coded commands and data. Contact: Cybernetic Micro Systems, 445-203 S. San Antonio Rd., Los Altos, CA 94022. **CIRCLE INQUIRY NO. 137**

Local T.O.F. Control

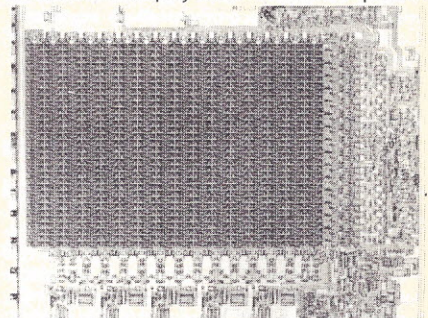
Now available from Keyboard Studio is a circuit for hardcopy terminals. This circuit, 2 7/8 x 4 3/4", derives its operating power from the terminal and performs a local top of form when the pushbutton is depressed. Page length is dip switch-selectable for up to 82 different positions. Two jumper



wires, installed by the user, allow for 99 positions. Using TTL logic, the model #012 has a miniature relay output compatible with any terminal having a line feed button. The circuit is completely assembled, tested. Contact: The Keyboard Studio, 1726 Mansfield, Birmingham, MI 48008. **CIRCLE INQUIRY NO. 138**

High-Speed 1K Bipolar RAM

Advanced Micro Devices has introduced the Am93415 and Am93425, 1024x1-bit RAMs. These fully decoded bipolar memories achieve a typical address access time of 30 nanoseconds. Both devices employ an active LOW chip-select



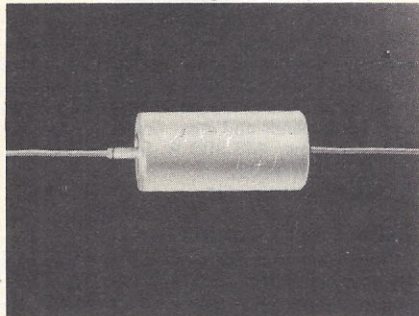
input for easy memory expansion and read out stored information on the non-inverting output. These devices are plug-in replacements for the like-numbered Fairchild parts. Contact: Advanced Micro Devices, Inc., 901 Thompson Pl., Sunnyvale, CA 94086. **CIRCLE INQUIRY NO. 139**

Low Power Quad Comparator

Precision Monolithics Inc. has added the quad CMP-04 to its line of comparators. With 1.0mV maximum offset voltage and 10nA maximum offset current specifications, the unit fits applications where additional system trims or components are not feasible. The CMP-04 operates from either a single 5V supply or from split supplies up to $\pm 18V$. Power supply current is a 2.0mA maximum and remains nearly constant with supply voltage and temperature changes. Contact: PMI, 1500 Space Park Dr., Santa Clara, CA 95050. **CIRCLE INQUIRY NO. 140**

Hermetically Sealed Capacitor

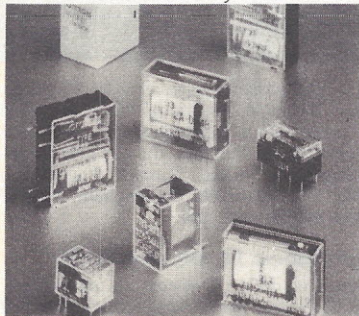
Plessey Capacitors is producing the W15 series tubular capacitor, presently available in T3 and T4 case sizes. The W15 is manufactured to meet MIL-C-39006/22 requirements. The tantalum units offer large capacity values in



minimum space requirements, as well as input and output filter needs of static inverters, pulse modulated and switching regulators, and other power supply applications. Contact: Plessey Capacitors, Inc., Tantalum Div., 5334 Sterling Center Dr., Westlake Village, CA 91361. **CIRCLE INQUIRY NO. 141**

Space-Saving Relays

A selection of low-profile and miniature PCB relays for OEM applications are available from Omron Electronics, Inc. The relays are engineered for space-saving design applications. Miniature/subminiature relays are used as low-



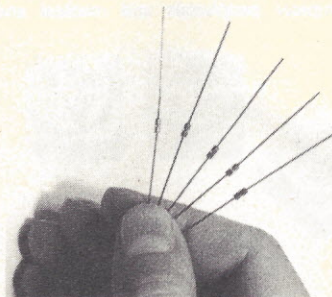
cost PC board and panel components in consumer, business and industrial products, including computers, home appliances, industrial machinery and telecommunications equipment. Contact: Omron Electronics, Inc., 650 Woodfield, Schaumburg, IL 60195. **CIRCLE INQUIRY NO. 142**

Keyboard Encoder

Using an NMOS silicon gate process, National Semiconductor has developed a single 28-pin integrated circuit to interface a detached keyboard to a CRT terminal. The device, MM57499, reduces interconnections to only 5 wire connections, having the capability of handling up to 144 keys. The component is designed to aid manufacturers of systems incorporating large terminals, word processors, and home computing systems. For a typical 96-key operation the MM57499 requires no external components: it provides direct interface, with serial transmit and receive to a 12x8 matrix keyboard. Contact: National Semiconductor, 2900 Semiconductor Dr., Santa Clara, CA 95051. **CIRCLE INQUIRY NO. 143**

High Temperature Sensor

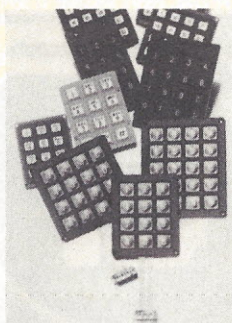
Midwest Components, Inc. has developed a hermetically sealed negative coefficient thermistor that can be used up to 400 °C because no solder is used in its glass diode construction. Resistance values are available from 2K ohms to 1 meg



ohms at 25 °C with tolerances of 2%, 5%, 10%, and 20%. Package style allows tape and reeling for high volume automatic insertion. Contact: Midwest Components, Inc., 1981 Port City Blvd., Muskegon, MI 49443. **CIRCLE INQUIRY NO. 144**

Keyboards for Rugged Use

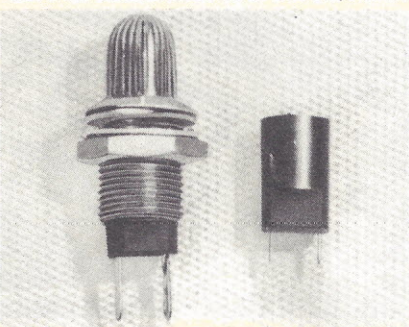
Industrial Electronic Engineers, Inc., is offering three types of keyboards designated as IEE-Thin-switch, Panelswitch and Thriftswitch. Thinswitch is a hi-rel, sealed keyboard for severe environment applications. Panelswitch features illum-



nated pushbutton keys, domed switch elements and sealing membrane. Thriftswitch is for commercial keyboard applications requiring mechanical switch matrix. Contact: IEE, 7740 Lemona Ave., Van Nuys, CA 91405. **CIRCLE INQUIRY NO. 145**

Vibration-Free Lamp Sockets

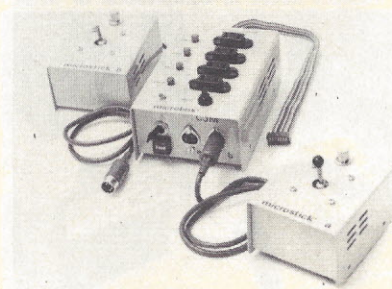
The Series 4611 Tiny-Mite is a threaded socket assembly for subminiature wedge-base incandescent lamps. They hold the lamps securely, make contact reliably, and will not loosen with vibration or shock. The sockets are complete with



high-dome round or flat lens and polished stainless steel bezel. Seven different lens colors are available. Lamps for the socket assembly come in 13 different voltage/current ratings from 2.5 to 28 volts. Contact: Industrial Devices, Inc., 7 Hudson Ave., Edgewater, NJ 07020. **CIRCLE INQUIRY NO. 146**

Apple Components

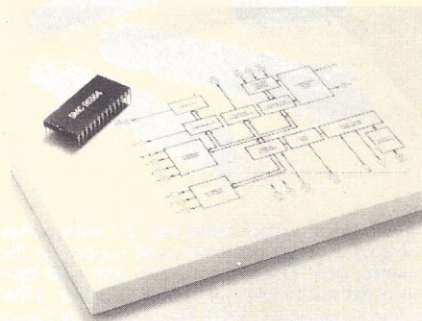
CJM Industries Inc. has available the Microbox and Microstik for the Apple computer. The Microbox plugs into the Apple game socket. It has 4 AC outlets which control external devices by commands from keyboard or programs. Four LEDs provide visual status of each port or socket.



Loads are switched by solid state components which isolate and protect the Apple. Two heavy duty jones plugs and sockets connect matching joystick modules (Microstiks). A tutorial manual and demo cassettes are included. Contact: CJM Industries, Inc., Dept. MB, 316B Victory Dr., Herndon Industrial Park, Herndon, VA 22070. **CIRCLE INQUIRY NO. 147**

CRT Controller

A CRT controller that controls functions for a 16 line x 64 character video display interfaces to any computer or microprocessor, or serves as a stand-alone video processor. Functions include CRT refresh, character entry, and cursor management. The unit, CRT 96364A/B, houses an in-



ternal oscillator which produces the composite sync output. The A version generates a 50Hz vertical sync; the B version 60Hz. Both devices require only a +5V power supply at less than 100mA. Contact: Standard Microsystems Corp., 35 Marcus Blvd., Hauppauge, NY 11787. **CIRCLE INQUIRY NO. 148**

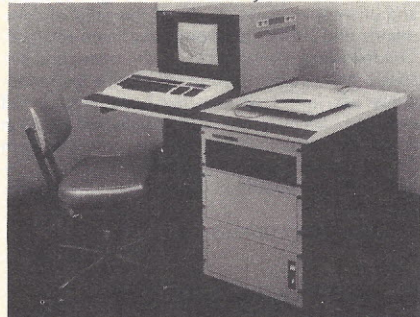
COMPUTERS

Business System for WP and DP

ABC Computers' DEC-based minichester incorporates the LSI 11/2 processor, RT-11 operating system, double density floppy drives, CRT and printer for both word processing and data processing activities. The turnkey system includes powerful word processing/data base management software with each system. The business software system, consisting of accounts receivable, accounts payable, order entry/inventory/invoicing, general ledger, and payroll is available as an add-on feature. Expansion is possible with a tabletop add-on 20 Mb Winchester with a tape cartridge backup unit. Contact: ABC Computers Inc., 500 Tonopah, P.O. Box 7529, Tahoe City, CA 95730. **CIRCLE INQUIRY NO. 149**

Color Graphics Computer with Pascal

The Ramtek Corp. high resolution, high performance 6214 Colorgraphic system offers four times the resolution, eight times the color selection and 25 times the vector writing speeds available in other Series 6000 models, as well as both 30 and 60 Hz memory refresh rates. The



system offers resolution of 640 x 480 picture elements. Basic configuration includes Z-80 CPU, floppy disk controller, floppy disk drive, color monitor, keyboard display and Pascal operating system. Contact: Ramtek Corp., 2211 Lawson Lane, Santa Clara, CA 95050.

CIRCLE INQUIRY NO. 150

Business System for Entry-Level Users

Rexon has developed the RX20 multi-terminal, multi-tasking computer system, primarily targeted at the novice. Its a 10 megabyte, hard disk system incorporating the Intel 8086, 16-bit micropro-

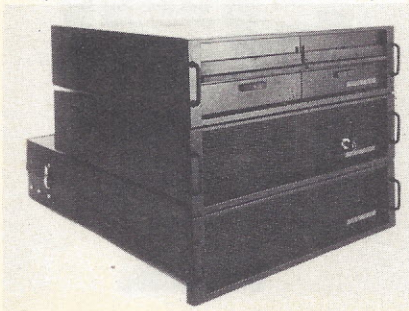


cessor. The system can be expanded to four terminals, two printers and 20 megabytes of storage, and includes a five megabyte removable cartridge plus a five megabyte fixed disk. Contact: Rexon Business Machines, 5800 Uplander Way, Culver City, CA 90230.

CIRCLE INQUIRY NO. 151

A Four-User CP/M Network

The Multi-User Z-System Computer is claimed to be the first multi-user microcomputer to implement multiprocessing, with discrete CPU and 64K RAM memory for each user. The system supports up to four users; each can execute any CP/M software using the 62K transient program area provided for each station. A four-user system



with hard disk requires only eight circuit boards on the S-100 bus: a master Z-64, multi-user I/O, four Z-64 satellite boards, hard disk controller and doubler floppy controller. These components provide 320K RAM, control for up to four drives, four CRTs and two printers. Micromation, 1620 Montgomery St., San Francisco, CA 94111.

CIRCLE INQUIRY NO. 152

Multi-Screen, Multi-Tasking System

Logical Machine Corp. has developed a multi-processing, multi-tasking, communicating business computer. Dubbed the Goliath, it uses ordinary English words in its programming. Hardware consists of a central message handling processor attached to a disk with up to 96 megabyte



capacity (unformatted). Each user terminal has its own processor and local floppy storage, together with its own optional local printer. Programming is at each user's screen/keyboard unit in a compilerless dialog language. Contact: Logical Machine Corp., 1294 Hammerwood Ave., Sunnyvale, CA 940986.

CIRCLE INQUIRY NO. 153

DISKS

High Capacity Floppy

A dual drive 5¼-inch floppy is available from Commodore Business Machines Inc. Designated CBM 8050, the drive has almost one megabyte of user storage, and provides a track density double the typical 48 tracks per inch found on most 5¼-inch drives. Relative record files and automatic diskette initialization are supplied. The

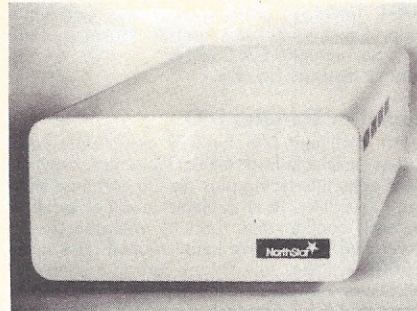


unit can copy all the files from one diskette to another without copying unused space and offers the ability to append to sequential files. Contact: Commodore Business Machines, Inc., 3330 Scott Blvd., Santa Clara, CA 95050.

CIRCLE INQUIRY NO. 154

Sector-by-Sector Backup

North Star Computers Inc. has introduced a Winchester-type 18Mb hard-disk enhancement for Horizon computers. Modified information is backed up on floppy disk on a sector-by-sector basis. This backup and recovery system provides



a way to save and restore information stored on a hard disk. Horizon users can add up to four 18Mb Winchester-type disks. Average access time is 78ms. Contact: North Star Computers, 1440 4th St., Berkeley, CA 94710.

CIRCLE INQUIRY NO. 159

New Options for HP System

Five assemblers and another disk drive have been added to options available for the Model 64000 Logic Development System by Hewlett-Packard. The disk drive, HP Model 7910H, is a Winchester-technology fixed model with

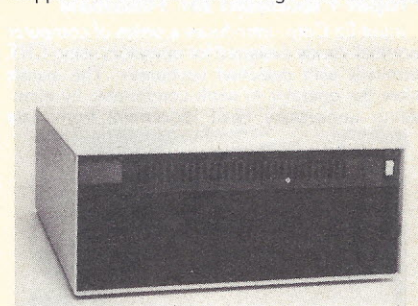


12-megabyte capacity. The stand-alone unit also includes a self-contained HP-IB (IEEE-488) controller and power supply in a table-top cabinet. Contact: Hewlett-Packard Co., 1507 Page Mill Rd., Palo Alto, CA 94304.

CIRCLE INQUIRY NO. 155

MDS-Compatible Storage

Advant Corp. has introduced a 10-megabyte Winchester disk data storage unit to the Intel microprocessor development system. Interfacing with a cable to all Intel MDS models, the Micro-Support Model 105 data storage unit reads Intel

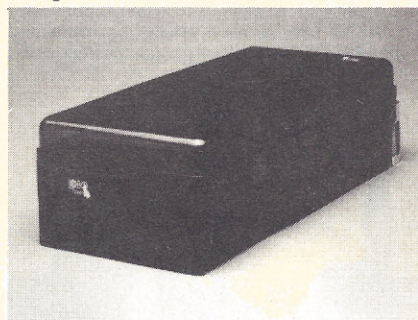


formatted disks. Shugart 8-inch Winchester disks enable storing 20 times more data than floppy disk. The interface provides operating speeds reportedly 20 times faster than currently available. Contact: Advant Corp., 696 Trimble Rd., San Jose, CA 95131.

CIRCLE INQUIRY NO. 157

Hard Disk Storage for Micros

Lobo Drives Int'l. has released three 10-megabyte Winchester technology hard disk memory systems. The Model 7710 T,A,S (T for TRS-80, A for Apple and S for S-100 computers) provides a way to add 10 megabytes of high speed mass storage. The 7710 comes with the IMI 7710

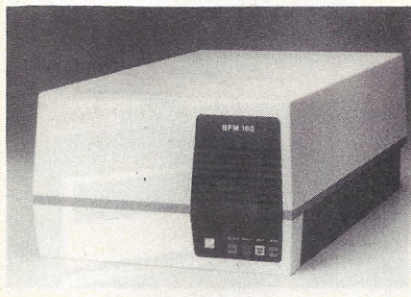


Winchester technology disk drive, intelligent controller, power supply, interface and related software. Interchangeable with standard floppy disk drives, it can be rack/slide mounted vertically or horizontally or placed on a table top. Contact: Lobo Drives Int'l., 935 Camino del Sur, Goleta, CA 93017.

CIRCLE INQUIRY NO. 158

High Capacity Winchester Drives

Ball Computer Products' Centennial Series 14-inch Winchester disk drives offer capacities of 90 and 158 megabytes. The head/disk assembly consists of a rigid deckplate, spindle, carriage/way assembly, three or four 14-inch disks, read/write heads and a servo head, all protected from



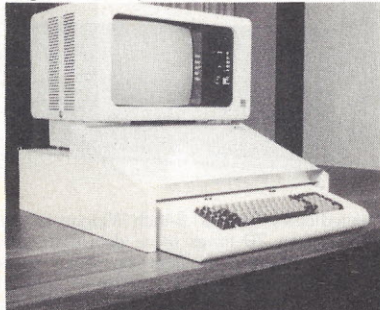
external contamination. All moving heads have low mass to provide fast access. Electronic components are carried on five printed circuit cards, partitioned into power supply, servo, digital control, interface and read/write control. Contact: Ball Computer Products, 860 E. Arques Ave., Sunnyvale, CA 94086.

CIRCLE INQUIRY NO. 160

FURNITURE

Proper Placement for Terminals

Input-Ez Corp. introduces a series of computer terminal stands designed for operators using CRT terminals with detached keyboards. The stands allow the operator to work comfortably by eliminating unnecessary head movement from data



sheets to the CRT screen. The stands may be used with standard height tables or disks, typing height tables, or L-secretarial desks. Contact: Input-Ez Corp., P.O. Box 3444, Englewood, Colorado 80155.

CIRCLE INQUIRY NO. 161

Desks House Computers

Terminal desks that increase work areas and save floor space is introduced by Data-MATE. The desks feature spacious tops and supply compartments. They provide ample leg room and come with black steel frames and chestnut wood



grain tops and trim. Available in 27 or 30-inch heights, the desks are offered in five styles with EIA rack mountable bay, supply drawer or hinged door cabinet. Contact: Data-MATE, The Maine Mfg. Co., 46 Bridge St., Nashua, NH 03060.

CIRCLE INQUIRY NO. 163

Desk for Micros

A hardware module designed for microcomputer systems is available from ComputerGoods. CompuDesk features a split-level top for elbow-height CRT operation and eye-level-while-sitting, waist-level-while-standing printer height. The module design offers arm's-reach packaging of up to five hardware pieces. The desk has two adjustable shelves and a self-closing door with an attached storage rack for manuals and magazines. Convection venting with a power fan is available for high-heat systems. It is constructed of birch plywood with walnut stain finish and Formica tops. Contact: ComputerGoods, P.O. Box 2635, Eugene, OR 97402.

CIRCLE INQUIRY NO. 162

I/O BOARDS

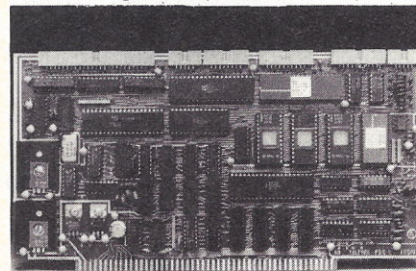
Interactive I/O

An interface/controller board being manufactured by MSI contains a resident 6800 CPU, 2708(2716) EPROM, 1K of RAM, and a choice of a PIA or an ACIA for communication to the outside world. The board contains a 6850 ACIA chip, which resides on the interface bus of the host computer system, emulating a standard serial interface, SI-1W. The interface is available in three different configurations, using the same circuit board with different components installed. The INTCPU-1W model is configured with a 6850 ACIA interface and is used for an intelligent console controller. The INTCPU-2W is configured with a 6821 PIA interface communicating with the external device. The model INTCPU-3W uses a 6821 PIA and 50-pin ribbon cable connector for communication with a Qume printer. The interface allows interactive I/O operations and buffering while relieving the load on the host CPU. Contact: Midwest Scientific Instruments, Inc., 220 W. Cedar, Olathe, KS 66061.

CIRCLE INQUIRY NO. 373

Small Microprocessor Board Offered

The Teletek FDC-1 combines an intelligent floppy disk controller with I/O normally required in a microcomputer system. It can be configured as the central processor in an S-100 system or a smart floppy disk controller with on-board software allowing flexibility. The board includes a



Z80-A CPU, two parallel ports, two serial ports, a double-density floppy disk controller, 8K byte capacity in any combination of EPROM, ROM or RAM, Intel-type 2716 programmer and timer chip. Contact: Teletek, 9767F Business Park Dr., Sacramento, CA 95827.

CIRCLE INQUIRY NO. 164

Serial or Parallel I/O

An intelligent I/O for PET and Apple computers, available from GPA Electronics, provides hard copy interfacing plus dial-up and time sharing capabilities. It is available in either serial or parallel configuration and is microprocessor-controlled. The device handles baud rates up to 9600; facilitates full dial-up and time share applications; provides remote input to BASIC; supports true IEEE protocol; supports standard EIA modem-control signals. Firmware is EPROM implemented, allowing for custom modification for special applications. Contact: GPA Electronics, 45501 U.S. 101 N., P.O. Box 931, Laytonville, California 95454.

CIRCLE INQUIRY NO. 166

Pertec 300-5-C BASIC Printer Driver

db Technology has developed a driver for the Qume printer that permits greater print flexibility. Printer control is by an expanded command set similar to that of the Qume Sprint 5. Among the new capabilities are backspacing and reverse print, which will facilitate underlining, overstrike, and other special effects. All of the original commands and 'Poke' locations have been retained. The following is a summary of the command set: space, backspace, carriage return, line feed, horizontal tab, form feed, negative half line feed, half line feed, negative line feed, printwheel position 4, set left margin, set right margin, reset, set form length, forward print and backward print. Contact: db Technology, Box 601, Cederville, Ohio 45314.

CIRCLE INQUIRY NO. 165

General Purpose I/O Card

Pro-Log Corp. has developed an STD Bus-compatible input/output card that provides four 8-bit TTL-compatible ports for a total of 32 I/O lines, each programmable as input or output with readback. The 7605 general-purpose digital card decodes eight address lines with provision for expansion and memory mapping. An on-card jumper system allows the user to map anywhere in the 256-port address field the four consecutive I/O pair addresses occupied by the card. Ports are accessed via two 40-pin latched connectors with .025-square-inch post headers. The card operates from a single +5 volt power supply. Contact: Pro-Log, 2411 Garden Rd., Monterey, California 93940.

CIRCLE INQUIRY NO. 167

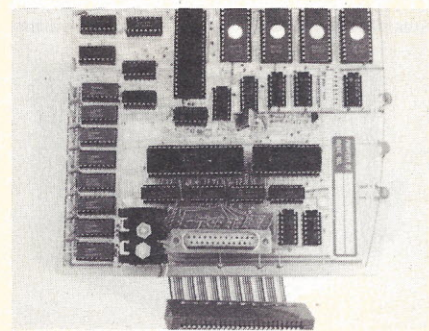
S-100 Control Panel

This unit features a 20-key matrix and 6-digit LED display controlled via firmware in the on-board EPROM. 2708 or 2716 EPROM with 256x8 RAM memory permits the user to design firmware for custom control applications. The switch keytops may be ordered blank or with engraved lettering to fit special requirements. Standard firmware and keyboard are available for 8080 and Z-80 systems with the S-100 bus. These EPROM programs allow the user to enter, modify and debug machine language software. Contact: Pike Electronics, 8190 Watsonville Rd., Gilroy, CA 95020.

CIRCLE INQUIRY NO. 168

Hard Copy Interface

Data Capital Co. has released Qume Commander CS-1, one in a series of interfaces for the hard copy computer industry. This intelligent interface provides complete text processing and plotting capability. Features include word/character manipulation, line manipulation, page mani-



pulation, printer control, plotting and full support of all TwinTrack/WideTrack functions. Specifications include 192-264 character print line, 26.3 inch print area, four different color ribbons at one time, up to 75 cps, software control of second printhead and platen. Contact: Data Capital Co., 702 Whitney St., San Leandro, CA 94577.

CIRCLE INQUIRY NO. 169

GIFTS & GADGETS



ITT Computer Phone—it's an automatic dialer...it's a calculator, it's a clock. Programs up to 24 numbers and dials them at the press of a button. The ITT Computer Phone is an all-in-one telephone for office or home. Plugs into ordinary modular jack system. #DD-1001 \$299.95 (\$3.85 Shipping & Handling)

Sanyo - Super Compact Micro-cassette Recorder—This unit has a 2 hr recording capacity, built in tape eraser, tape counter and all metal construction. #DD-1002 \$229.95 (\$2.95 Shipping Handling)



Extend-A-Phone
Now you can really reach out and call someone! Extend-A-Phone gives you the ability to dial out and answer from up to 400 ft. away from your telephone. Cordless and no monthly service charges. You can install it yourself. #DD-1008 \$299.95 (\$4.25 Shipping & Handling)

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Language Translator—by Texas Instruments—The Remarkable talking electronic translator with electronic voice and brain. This unit comes with a special carrying case, earphone, 110V AC adapter and Word/Phrase Guide. #DD-1007 \$299.95 —French, Spanish, German, and Italian module \$60.00 (\$2.95 Shipping & Handling)

Bino/Cam—This combination binocular and camera system features 112mm telephoto lens, 1/125 second shutter speed, 7-power x 20mm wide angle binocular. All this is contained in one lightweight 19.5 oz unit. #DD-1003 \$259.95 (\$3.80) Shipping & Handling

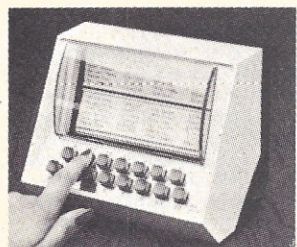


Canon P7-D Hand Held Calculator—The Canon P7-D is the world's smallest plain roll paper printing and display calculator—carry it in a briefcase, automobile glove compartment, or even a lady's shoulder purse. #DD-1006 \$79.95 (\$3.85 Shipping & Handling)



Easa-Phone Panasonic Automatic Dialer—Easa-Phone can be connected to all types of telephones. This unit gives you true-touch tone dialing. You can program up to 32 numbers with a lighted display to show what number is being dialed. #DD-1009 \$199.95 (\$2.95 Shipping & Handling)

Panasonic Remote Answering Machine T-1520—This multiple functioning answering machine will make your life easier. With features like a double cassette system, two-way recording, built-in microphone, ring control, selectable recording time and much more. #DD-1010 \$299.95 (\$5.70 Shipping & Handling)



Phone Directory—Just press a letter key and the index spins to that letter to reveal your collection of numbers. Battery-powered. #DD-1004 \$29.95 (\$2.95 Shipping & Handling)



Music On Hold—This easy-to-install unit allows you to provide music over your telephone, when you have to be away from your phone. No wires to connect! #DD-1005 \$29.95 (\$2.95 Shipping & Handling)

**Mail Check or Money Order
including handling charge
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6575 Green Valley Circle, Suite 112
Culver City, California 90230

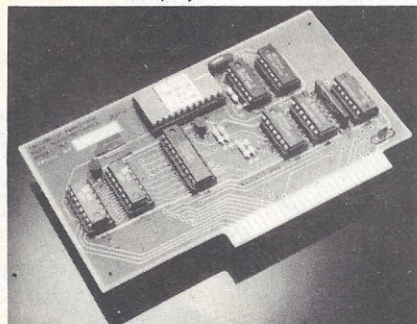
Free-Standing Controllers

Four graphic controllers from California Computer Products, Inc. consist of two magnetic tape readers and two offline/online controllers. The Models 916 and 920 magnetic tape readers are interconnecting devices between the user's online controller and host computer; the Models 918 and 922 are intelligent interconnecting devices between CalComp plotters and host computers. All four are free-standing units with a 10½" read-only magnetic tape transport, operator control panel and English-language operator message display. A number of tape formats are available including seven track—200, 556 and 800 bpi; and nine track—800 and 1600 bpi; an option is available which allows operator selection of any of these formats. Contact: CalComp, 2411 W. La Palma Ave., Anaheim, CA 92801.

CIRCLE INQUIRY NO. 170

Decreasing Applesoft Execution Time

The California Computer Systems Model 7811B arithmetic processor unit is designed to increase both the execution speed of Applesoft II programs and the number of math functions available. The card employs the AMD9511 APU and

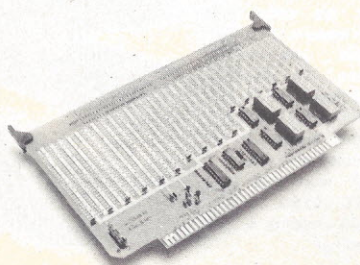


provides high performance on fixed and floating point arithmetic operations and on floating point trigonometric operations, and greatly enhances the mathematical capabilities of the Apple II. Contact: California Computer Systems, 250 Caribbean Dr., Sunnyvale, CA 94086.

CIRCLE INQUIRY NO. 171

Buffered Prototyping Board

The 9612 is a general purpose prototyping board compatible with the M6800 microprocessor bus. It is pin and outline compatible with the EXORciser and other industry standard cards. The board provides a convenient means of pro-



ducing breadboards and low volume special purpose modules. The board can be used with the Scotchflex breadboard Plug Strip system as well as wrap-type terminations. Contact: Creative Micro Systems, 11642-8 Knott Ave., Garden Grove, CA 92641.

CIRCLE INQUIRY NO. 172

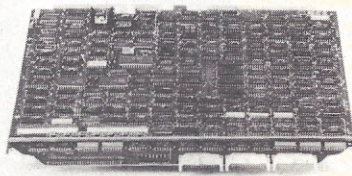
Storage Subsystem

Konan's DAT-100 single board controller accommodates the DEI 15½ megabyte (formatted) cartridge tape drive as well as the Marksman Winchester disk drive. Hard Tape is available as a complete tape and disk mass storage system or a tape or disk subsystem. Supports FAMOS, CP/M 2.0 and MP/M software. Contact: Konan Corp., 1448 N. 27th Ave., Phoenix, AZ 85009.

CIRCLE INQUIRY NO. 173

Intelligent Disk Controller

The MSC-1990 is a single-board, high-density disk drive controller that is plug compatible with TI-990 minicomputers. It provides control for up to three storage module disk drives and utilizes recent advances in disk storage technology without modifying existing software. Features include software transparency, higher capacity,

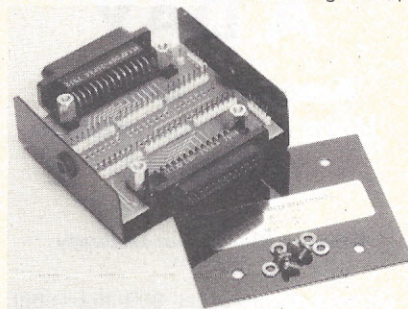


higher data transfer rates and automatic head and cylinder switching. Built-in error handling features include hardware error correction code and automatic retry capability. Firmware-implemented techniques continuously monitor all operations. Contact: Microcomputer Systems Corp., 432 Lakeside Dr., Sunnyvale, CA 94086.

CIRCLE INQUIRY NO. 174

Custom RS-232 Interconnection

The Remark Model 54 Stunt Box provides a simplified method for customizing connections between different RS-232 based devices. The box includes a PC card containing one male and one female RS-232 connector with frame ground, pin

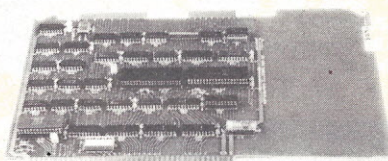


1, permanently connected between connectors. Two grommeted access holes are provided to connect external devices to the custom circuitry. Contact: Remark International, 4 Sycamore Dr., Woodbury, NY 11797.

CIRCLE INQUIRY NO. 175

Diskette Controller for Multibus

The ZX-204 Universal Diskette Controller enables OEM system designers to code custom disk I/O drivers. It will interface up to four double sided, double density standard sized drives for as much as 4 million bytes on-line storage for SBC-80 Multibus systems. Complete diskette



drive interface and data separator circuits combined with an LSI floppy disk controller chip and Multibus interface reduce the problem of including diskette storage to simply coding the I/O drivers and running. Contact: Zendex Corp., 6398 Dougherty Rd., Dublin, CA 94566.

CIRCLE INQUIRY NO. 178

Home Controller Interface

Whistler is a software controlled ultrasonic interface designed to allow complete control of the BSR Home Control System from the TRS-80 microcomputer. The BSR unit must have the ultrasonic remote controller option installed. The interface is self-contained, requires no physical attachment to the BSR unit, and requires a single connection to the tape recorder output plug from the TRS-80. The unit contains an ultrasonic oscillator and piezoelectric transducer, and is controlled with signals from the tape recorder output port. Cassette software included contains the necessary coding patterns for full control of all BSR functions, including bright and dim lamp controls. Contact: Small System Software, P.O. Box 366, Newbury Park, CA 91320.

CIRCLE INQUIRY NO. 176

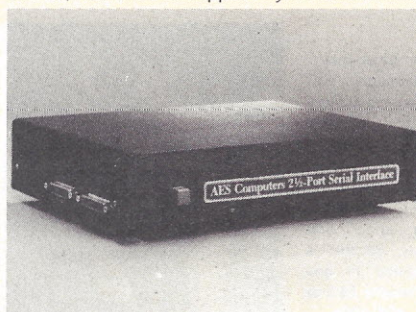
Line Controller Unit

Sykes Datatronics' Comm-Stor 8A1 Line Controller unit, used in conjunction with the 8A1 selective addressing communications system, allows implementing or improving a multi-point 8A1 communications network. The unit requires only a few simple inputs from the operator. It is a dual drive floppy disk system with a temporary message storage capacity of more than 200,000 bytes or up to 1000 messages. The controller is capable of communicating asynchronously up to 1800 bps or isochronously up to 2400 bps. Additional flexibility comes from the ability to remotely name files for transmitted messages, and to remotely configure the line controller from any station by means of secure password entry. The polling sequence may also be easily changed. Messages can be transmitted selectively to individual stations, groups of stations, or broadcast to the entire network. The unit can monitor and determine both network station status and traffic volume on a station-by-station basis. Contact: Sykes Datatronics, Inc., 375 Orchard St., Rochester, NY 14606.

CIRCLE INQUIRY NO. 177

Port Serial Interfaces

The AES Computers self-contained 2½ and 4½ port serial interfaces provide 2 or 4 serial communication controllers. A flexible interface bus to the host computer can be adapted to various microprocessors with plug-in modules and adapter cables. Using the 8251A serial controllers, the interface supports synchronous com-



munication modes to 64K baud and asynchronous communication modes to 19.2K baud. All aspects of the communication mode for each channel are software programmable. Contact: AES Computers, 118 S. Loara, Anaheim, California 92802.

CIRCLE INQUIRY NO. 179

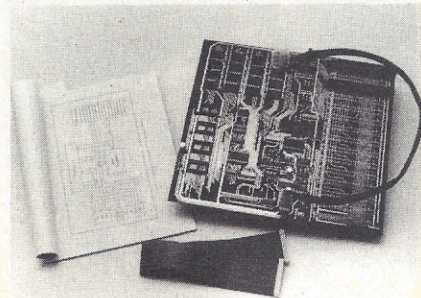
Screen Conversion Board

The Sup'R'Terminal is an intelligent plug-in board for the Apple II that converts the screen to an 80 column x 24 line, upper/lower case display using a 5x8 dot matrix, ASCII character set. The user-installable board is compatible with all Apple II versions of BASIC and Pascal as well as peripherals such as disk drives and printers. 2K of board-based software includes upper/lower case shift, cursor movements, cursor modes, scrolling modes, scrolling controls and more. Contact: M&R Enterprises, 418 Arguello Blvd., Suite 2, San Francisco, CA 94118.

CIRCLE INQUIRY NO. 184

I/O Expansion Module

George Goode & Assoc. offers a memory and I/O expansion module (MEM) for the Texas Instruments University Module 16-bit micro-computer board. MEM has sockets to expand the module's memory by an additional 8K bytes, and CRU I/O address space by an additional 480

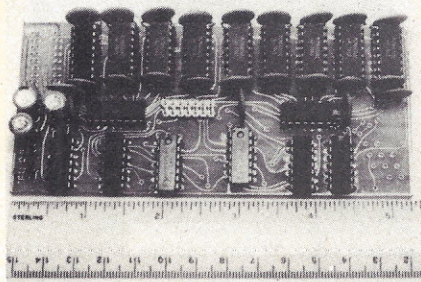


bits. An EPROM programmer with software driver, plus all the connectors, cables and integrated circuit components required to interface with the University Module are included. Contact: George Goode & Assoc., 12840 Hillcrest Rd., Suite 113, Dallas, TX 75230.

CIRCLE INQUIRY NO. 180

TRS-80 to CP/M Conversion

Field Engineering Consultants is marketing a circuit board and operating system that convert the TRS-80 upon software command to a CP/M type machine that loads programs at HEX 100 and responds to Call 5. The disk format is changed to a 128 byte, 18 sector IBM format. Freedom Mode (F.E.C.'s version of CP/M) supports serial

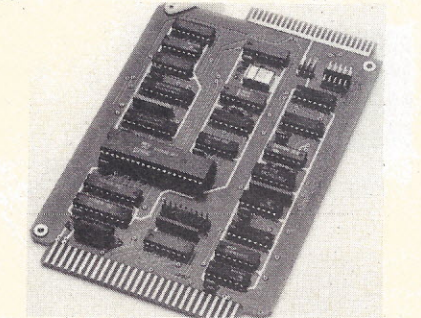


(through RS232 board) and parallel printers. The operating system supports both 35 and 40 track disk drives. Freedom Mode permits compatibility with other Z-80 based machines that use 5¼" disks. Contact: Field Engineering Consultants, Ltd., Box 2368, Woburn, MA 01888.

CIRCLE INQUIRY NO. 181

Floppy Disk Controller

The SB8500 Floppy Disk Controller from Micro/Sys is an STD bus compatible module including all drive control, data formatting, and error detecting logic required to handle up to 4 floppy disk drives. The controller supports both



single and double density IBM-compatible recording formats. Over 4 megabytes of storage can be controlled if double sided, double density drives are used. Only one slot in an STD bus backplane is required. Contact: Micro/Sys, Inc., 1353 Foothill Blvd., La Canada, CA 91011.

CIRCLE INQUIRY NO. 182

Image Processing Scan Converter

The Robot Model 650 from Robot Research is for interfacing between computers and TV monitors. The unit has a 256 x 256 x 6 MOS frame-store memory permitting a picture to be frame-grabbed from a television camera and supplied to the computer on a random access basis.

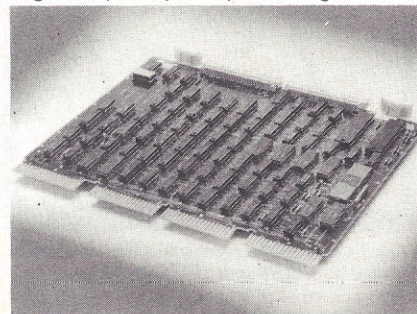


One picture element can be moved every 63.5 microseconds. Frame-grab memory contents are viewed on a television monitor at all times and may be replaced from the computer on a random access basis. As frame-grab memory data is altered by the computer, the image on the monitor also changes. Contact: Robot Research, Inc., 7591 Convoy Ct., San Diego, CA 92111.

CIRCLE INQUIRY NO. 183

Quad Size Circuit Module

The Model DU-130 microprocessor-based coupler is contained on one quad printed circuit module including on-board LED indicators providing visual display of coupler status. The magnetic tape coupler requires a single PDP-11



SPC slot to interface up to eight dual density (NRZI/PE) formatted magnetic tape drives. The module couples two formatted tape drives with three slave units each from a single PDP-11 SPC slot. Contact: Dialog Corp., 12800-G Garden Grove Blvd., Garden Grove, CA 92643.

CIRCLE INQUIRY NO. 185

Voice I/O for Sorcerer

The Cognivox plugs into Exidy's Sorcerer computer and offers a 16 word recognition vocabulary plus voice response with up to 16 words or phrases. Recognition accuracies of up to 98% are possible with cooperative speakers. The unit is self-contained and includes a microphone



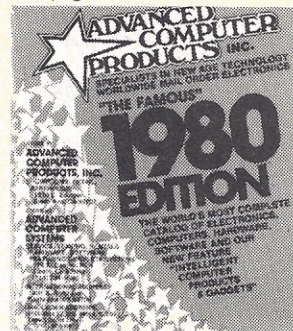
and amplifier/speaker. A software library contains a talking calculator program that simulates a four function calculator without looking at the CRT screen. A vocal memory dump program can read out loud its memory in hexadecimal format. Contact: Voicetex, Box 388, Goleta, CA 93017.

CIRCLE INQUIRY NO. 186

LITERATURE

New ACP Catalog

Advanced Computer Products, Inc. is offering its 1980 worldwide mail order catalog. This year's 144 pages include electronics, computers,

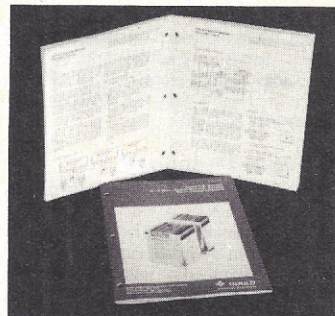


hardware, software, and various computer products. Contact: Advanced Computer Products, 1310 "B" E. Edinger, Santa Ana, CA 92705.

CIRCLE INQUIRY NO. 378

Bulletin on Proximity Systems

A free 53-page bulletin from Gould Inc. describes the company's switching amplifiers, isolation units, universal logic gates, bistable relays, speed monitors, synchronization monitors, rotation direction indicators, frequency to current



convertors, current to frequency convertors, pulse divider units, pulse summators, relay units and DC power supply units. In addition to descriptions and technical data, the bulletin features functional drawings and circuit diagrams. Contact: Gould R.B. Denison, 103 Broadway, Bedford, OH 44146.

CIRCLE INQUIRY NO. 187

Storage Equipment Planner

Instant Storage Catalog 801 for storage planning is offered free of charge by Bernard Franklin Co. Helpful for new facilities or additions to existing storage areas needing equipment immediately, the catalog contains ideas on how to layout storage areas and contains types of equipment such as steel shelving, pallet racking, storage-retrieval and mezzanine systems, lockers, gondolas, benching and shop equipment. Contact: Bernard Franklin Co., 4424 Paul St., Philadelphia, PA 19124.

CIRCLE INQUIRY NO. 188

Guide to Writing Software

Atlantic Analysis Corp. has published Micro-computer Software Development Notebook, second in a series of books for anyone using a micro-computer. The businessman can develop his own systems as well as evaluate professional proposals. The professional can use it to assist and speed the development of software. Novice programmers can use it as a text and guide. As an education and reference tool, the notebook begins where BASIC and Advanced BASIC texts leave off. It does not teach a language but an organized approach to efficient software design, development, documentation and delivery. Contact: Atlantic Analysis Corp., 5 Koger Executive Center, Suite 219, Norfolk, VA 23502.

CIRCLE INQUIRY NO. 189

Electronic Kit Catalog

A 104-page catalog describing the latest in electronic kits is available free from Heath Co. It lists 400 kits for home computers, color TV, amateur radio, audio components, precision test instruments, educational self-instruction



programs and electronic devices for the home. Foreign language self-instruction programs are introduced, including Spanish, French, German and Italian. Contact: Heath Co., Benton Harbor, MI 49022.

CIRCLE INQUIRY NO. 190

Micros in the Classroom

The TRS-80 Microcomputer Sourcebook for Educators, a guide to the use of microcomputers in the classroom and as a tool for the school administrator, is available from Radio Shack. The free 27-page booklet provides guidelines for selecting a system based on potential applications, costs, service, reliability and courseware. Contact: Radio Shack, Dept. NR-17, 1300 One Tandy Center, Fort Worth, TX 76102.

CIRCLE INQUIRY NO. 191

Micro Series Described

Divebiss Corp. offers a four-page brochure describing the ICM Series of microprocessor-based programmable controllers. The series offers control for production and processing machinery requiring a controller with relatively few inputs/



outputs, incorporating the features of larger programmable controllers. The brochure contains descriptive information and specifications on available program development peripherals. Contact: Lindon Communications, 1225 E. David Rd., Suite 3, Dayton, OH 45420.

CIRCLE INQUIRY NO. 192

Pharmaceutical Uses for WP

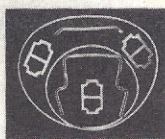
Wordstream Systems Group is offering a free, four-page guide on word processing applications in the pharmaceutical industry. The booklet details how word processing can be used to simplify investigation of new drug and new drug applications reports; explains how it can increase efficiencies in the preparation, storage and retrieval of legal documents affecting pharmaceutical firms; and touches on record keeping, the creation of standard forms, the compilation and updating of lists of physicians, hospitals and pharmacists for marketing, sales and medical departments. The guide also gives a comparison of mechanical WP units, standalones and advanced shared logic systems. Contact: Wordstream Systems Group, Basic Four Corp., 300 E. 44 St., New York, NY 10017.

CIRCLE INQUIRY NO. 193

Increase EMI/RFI Shielding

Methods for increasing EMI/RFI shielding are described in Application Notes ESG-05, now available from Metex Corp. Cutaway drawings and graphs show construction details of the elastomer used in the process as well as typical

SHIELDING AGAINST EMI/RFI UNDER STRINGENT MECHANICAL AND THERMAL CONDITIONS

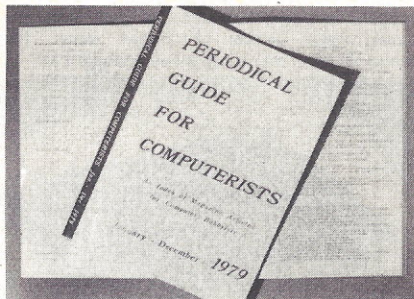


shielding effectiveness based on worst case testing methods. Photos show the flexible conduit and illustrate the broad range of sizes and shapes that are possible in gaskets made of elastomer. Contact: Electronic Shielding Group, Metex Corp., 970 New Durham Rd., Edison, NJ 08817.

CIRCLE INQUIRY NO. 194

Index on Computer Articles

The January-December 1979 Periodical Guide for Computerists indexes over 2000 articles from 20 personal computing and professional electronic publications. Articles, editorials,



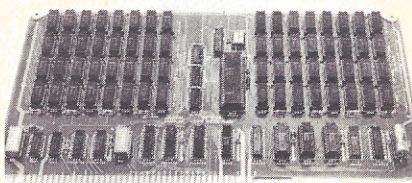
book reviews and relevant letters from readers are indexed by subject under 110 categories. A list of authors is cross-referenced by subject to aid in locating articles. Contact: E. Berg Publications, 622 E. Third, Kimball, NE 69145.

CIRCLE INQUIRY NO. 195

MEMORY BOARDS

Multibus Compatible Board

Zendex has introduced the 128K byte RAM card, Model ZX-028, which can perform byte swapping for use in SBC-80 systems with 8-bit words or SBC-86 systems transferring either 8-bit or 16-bit words. It is available unpopulated or populated in 32K steps to 128K bytes. Address is

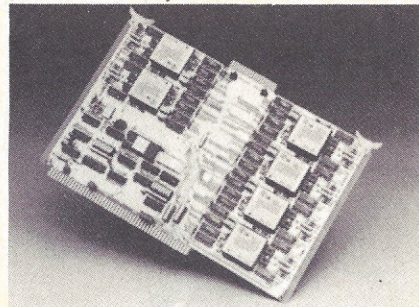


switch selectable on 32K byte boundaries located in 1M range. Access time is 450ns maximum. Requires only the +5V logic power supply. On-board data buffers handle data written into or read from the memory array. Contact: Zendex Corp., 6398 Dougherty Rd., Dublin, CA 94566.

CIRCLE INQUIRY NO. 196

Non-Volatile Storage Module

An addition to its TM990 compatible bubble memory systems is available from Texas Instruments. The board, designated TM990/211, offers up to 768K bytes of non-volatile storage capacity. The module uses the TIB1000 million-bit bubble memory device and has an on-board

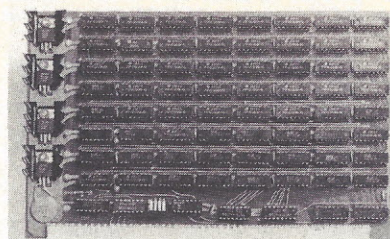


custom controller that provides complete interface to the TM990 bus. Data transfers are via the CRU mode. The module can do single or multi-page transfers, at a maximum data transfer rate of 85K-bits per second. Contact: Texas Instruments, Inc., IA, M/S 308, Dallas, TX 75265.

CIRCLE INQUIRY NO. 197

8K Static Memory

Pyramid Data has introduced the PDC8K, an 8K static memory board for the SS-50 bus with three speed options: 650ns, 450ns and 250ns. Other options include sockets and DIP switches for addressing. The circuit board is solder masked

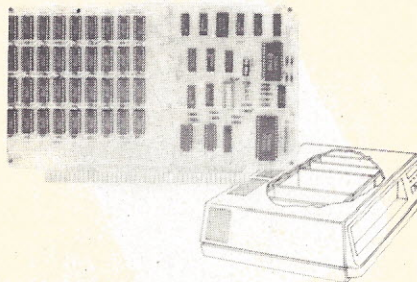


on both sides. All input and output lines are buffered to reduce loading and increase drive. The users manual provides assembly instructions and a theory of operations section. The card is available in a kit, or assembled. Contact: Pyramid Data Corp., 22N159 Pepper Rd., Box 532, Barrington, IL 60010.

CIRCLE INQUIRY NO. 198

64K Dynamic RAM Module

The M64EX EXORciser bus compatible RAM micro-module features transparent refresh and optional parity check and includes an address translator circuit that accommodates program-controlled memory allocation, useful in multi-tasking. The module permits any combination of 4K blocks of RAM—within the upper 32K bytes

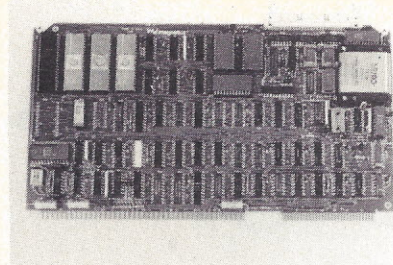


of memory space—to be enabled or disabled with an on-board DIP switch. Other features include DIP socket mounting of RAM and complex IC chips and three-state buffered interfacing with the system bus. Contact: Percom Data Co., 211 N. Kirby, Garland, TX 75042.

CIRCLE INQUIRY NO. 199

One-Megabyte Bubble Memory Board

A 128-kilobyte nonvolatile bubble memory board, the iSBC 250, is a 6.75 x 12 inch printed circuit board with one Intel 7110 million-bit magnetic bubble memory module, an 8085A-based controller and standard components. Designed to interface with the company's Multibus, the board can be used with the iSBC

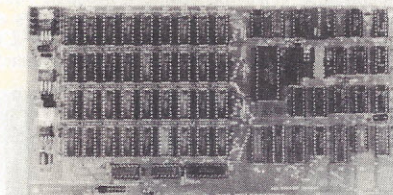


single-board computer family or in development systems. Included are a 7230 current pulse generator, a 7242 dual formatter/sense amplifier, two integrated circuits providing power-fail protection and automatic error correction. Contact: Intel Magnetics, 3000 Oakmead Village Dr., Santa Clara, CA 95051.

CIRCLE INQUIRY NO. 200

64K Dynamic RAM Board

The Model 460 dynamic RAM memory board is a high-speed low-power system that provides 64K bytes of memory in four blocks, each individually deselectable under program control for

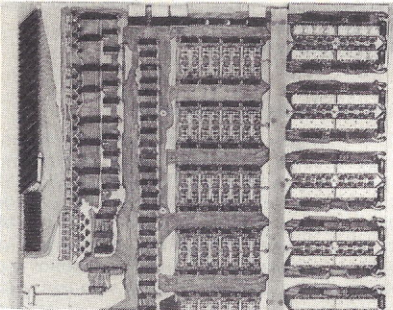


memory mapping. A parity feature provides increased data security. Additionally, the unit supports 8080 or Z80 CPUs and operates at 4 MHz with no wait states. Contact: Industrial Micro Systems, 628 N. Eckhoff, Orange, CA 92668.

CIRCLE INQUIRY NO. 201

128K Memory Module

Alpha Data Inc. offers a line of solid state mass memories using magnetic core technology. The series is available in memory capacities of 1/4, 1/2, 3/4 and one megabyte, in a 9-inch high rack mounted assembly. Basic to the M/CORE system is a 128K word by 18 bit core memory

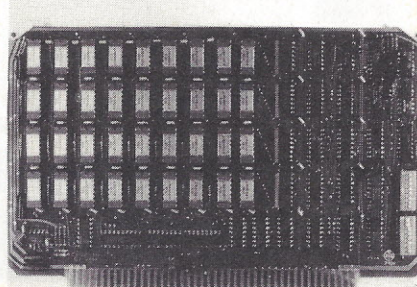


module in a pluggable printed circuit assembly. It is suited for DP and real time control applications where data must be moved fast, on line, and stored under power outage conditions. The memory is solid state; periodic preventive maintenance is not prescribed. Contact: Alpha Data, Inc., 20750 Marilla St., Chatsworth, California 91311.

CIRCLE INQUIRY NO. 202

High Speed Memory

Designed specifically for operation with the Motorola EXORciser I and II, and Rockwell system 65 is Chrislin Industries' CI-6800-2 dynamic memory system, in 16K, 32K, 48K or 64K configurations. The memory board plugs directly into EXORciser connectors, and allows maximum processor throughput with the use of hidden refresh control logic on board. Data access time is



225 nsec and cycle time is 400 nsec allowing operation as a static RAM at clock rates above 1.5 megahertz. For 2 megahertz operation, a cycle stealing refresh operation is utilized. Contact: Chrislin Industries, Inc., 31352 Via Colinas, #102, Westlake Village, CA 91361.

CIRCLE INQUIRY NO. 203

MICROCOMPUTERS

Computer Portability

The Jimini computer is a self-contained system. Compatibility to any type of task, including business, engineering and field service, is accomplished through the standard S-100 card cage. System has a 4Hz Z80 processor, 48K

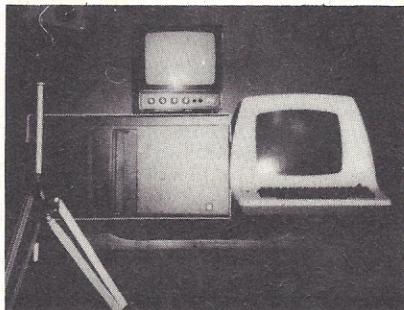


RAM, software selectable 80K or 170K disk storage. Anti-glare 9" screen is supported by a 77-key alphanumeric keyboard. Contact: GM Research, Inc., 1048 E. Burgrove St., Carson, CA 90746.

CIRCLE INQUIRY NO. 379

S-100 Microcomputer Systems

Tecmar has two S-100 stand-alone microcomputer systems for general use as well as for data acquisition and video applications. Each basic system consists of a Z-80 CPU, 64 Kbyte of 300 nsec static RAM, ADM-3A alphanumeric ter-



minal, dual 8" floppy disks, disk controller, 24 parallel lines, desk-top enclosure with power supplies and cables, CP/M 1.4 or 2.0 and higher level language support. Contact: Tecmar, Inc., 23414 Greenlawn Ave., Cleveland, OH 44122.

CIRCLE INQUIRY NO. 380

Data Acquisition and Analysis System

The Data.3 Z-80 microprocessor-based system consists of a complete data taking software and analysis package and includes the mainframe computer with 32K RAM memory, real-time clock, and an automatic hardware restart. The link to the sensors is a 64-channel (8-bit) A/D board programmable for gains of 1 to 1000. Data can be stored on its floppy disk mass storage system of 180K bytes, or interfaced to the user through an ACT 1A full ASCII keyboard and video monitor. A starter package of eight sensors is provided with other expanded configurations and peripherals available. Contact: Londe-Parker-Michels, Inc., 7438 Forsyth, Suite 202, St. Louis, MO 63105.

CIRCLE INQUIRY NO. 204

Word Processing System

The Exidy 80/2 features a 63-key typewriter style keyboard with 16-key numeric keypad, industrial grade 12" CRT with non-glare screen, 128 upper/lower case characters, 128 user-defined graphic symbols, two disk drives with 616,000 formatted bytes of storage and 132-column, daisywheel printer with 96-character print wheel. Software performs text editing and formatting for small/large business applications and features high level user defined commands for such repetitive tasks as mail merge letter typing, multiple column printing and multiple forms entry. One-key commands include end-to-end cursor line SCAN, TAB, INDENT, soft-HYPHEN, and four-direction cursor control. Contact: Exidy Data Products Div., 390 Java Dr., Sunnyvale, CA 94086.

CIRCLE INQUIRY NO. 205

Large Capacity Small Business System

Computhink has available the MINIMAX microcomputer system designed for small business and independent software organizations. The system offers a capacity of over 100,000 bytes of internal memory and by using various configurations of floppy disk drives can have an



on-line disk storage capacity ranging from 800K to 4.8 megabytes. The system features full-screen data entry with capabilities for character deletion or insertion and individual field-editing with field protect and automatic skip to the next field. Contact: Computhink, Inc., 965 W. Maude Ave., Sunnyvale, CA 94086.

CIRCLE INQUIRY NO. 206

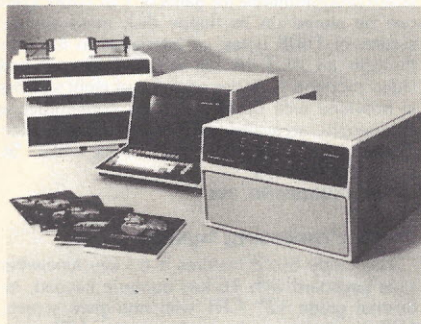
Micro for Non-Technical Users

A portable self-prompting computer is available from Computer Devices, Inc. The Miniterm Model 1206/PAT operates with preprogrammed application modules that can be tailored to the environment and programmed to prompt the user interactively. The system has a 64K processor including 32K of RAM work space. The application programs are written in BASIC or Motorola 6800 assembly language. Other features include an 80 column, 50 character-per-second thermal printer, integral minicassette drive, built-in modem and acoustic coupler. Options include switch-selectable 80 and 132 column printing, integral alphanumeric bar code reader, and DOS capable of supporting up to 1.44 megabytes portable, mini-diskette storage. Contact: Computer Devices, 25 North Ave., Burlington, MA 01803.

CIRCLE INQUIRY NO. 208

Microcomputer Development System

EXORmacs by Motorola is a development system for the design of microcomputers using the MC68000 microprocessor. The system supports the 16-bit capability of the MC68000 and anticipates the requirements of the next generation of 32-bit machines. The system comprises a



microcomputer chassis, replete with functional modules, an intelligent CRT terminal, a 132-column line printer and a 1-megabyte dual-drive floppy disk mechanism. An advanced operating system, symbolic debug assembler/editor and Pascal compiler constitute the software complement. Contact: Motorola Semiconductor Products, Inc., P.O. Box 20912, Phoenix, Arizona 85036.

CIRCLE INQUIRY NO. 207

Desktop Computer for Math/Science

Interactive Computer Systems has the System/900 desktop computer designed with scientists, engineers, mathematicians and statisticians in mind. This virtual memory system includes a full alphanumeric keyboard with a symbolic-mathematical character set, a collection of math/science functions, a user oriented file system allowing storage and retrieval of objects by name, and array processing capability. Up to 2000 programs may be stored on each interchangeable diskette. Up to eight diskettes can be loaded at a time. Contact: Interactive Computer Systems, Inc., 312 E. 23rd Street, New York, New York 10010.

CIRCLE INQUIRY NO. 209

Business Unit with Options

Smoke Signal Broadcasting has released the 6809-based series of Chieftain business systems featuring multi-user and 20 megabyte hard disk options. The system is configured around SSB's Chieftain microcomputer with 64KB of main memory and the DCB-4 disk controller capable of handling four 8" floppy disks, each storing a full megabyte of data. The hard disk provides



10MB of fixed and 10MB of removable storage and can be accessed by up to four users. Available programs include payroll processing, inventory control, accounts payable, order entry, accounts receivable, invoice entry and general ledger. The series supports COBOL, FORTRAN and UCSD Pascal. Contact: Smoke Signal Broadcasting, 31336 Via Colinas, Westlake Village, CA 91361.

CIRCLE INQUIRY NO. 210

Multi-Terminal Emulator

The 700/RTE total information processing system provides stand-alone word processing and data processing with the capability to communicate with a central computer. In the data processing mode, this system can operate as an I-3270, I-2260, U-100, U-200, TTY and H-2000 in protocols such as sync or async — even 83B.



The system can easily switch applications without changing hardware. A 55-cps bidirectional daisy-wheel printer provides the necessary printout capability. The terminal system is software controlled and can be provided with add-on features and functions by adding software packages. Contact: Megadata Corp., 35 Orville Dr., Bohemia, New York 11716.

CIRCLE INQUIRY NO. 211

Compact Micro Package

Wave Mate, Inc. has made available the Series 2000 microcomputer system along with the UCSD Pascal software package. The system is packaged in a compact, desk-top enclosure and includes a double mini floppy disk drive and controller, two high speed microprocessors, 64K bytes of dynamic RAM, boot ROM, 12" CRT, commercial keyboard with function keys and



numeric pad, two serial ports and the provision to attach a Winchester disk. The UCSD Pascal has been adapted for this system and includes disk operating system with file handler, one pass Pascal compiler producing universal P-code, full screen and character editor, conditional macro assembler, linker, P-code interpreter, utility library. Contact: Wave Mate, Inc., 18005 Adria Maru Lane, Carson, CA 90746.

CIRCLE INQUIRY NO. 212

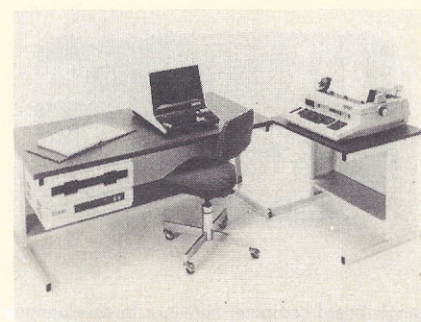
Development Module

A single-board microcomputer to assist in development and evaluation of hardware and software for Z8 single-chip microcomputer-based systems is available from Zilog. The Z8 Development Module uses the 64-pin version of the Z8 to prototype a Z8-based system. The code can be transferred to the ROM on the mask-programmed 40-pin version of the Z8. Two serial RS232C interfaces allow the 11 x 14 inch board to be used stand-alone with a CRT, or connected to a Zilog PDS or ZDS-1 system. Cable connection permits transfer of Z8 software from the host system where it is developed to the module for testing. Two 64-pin Z8s are included on the module: one program monitor CPU and one user-accessible CPU that can also address external memory. The module contains 4K bytes of 2716 monitor EPROM and 2K bytes of 2114 user static RAM. Contact: Zilog, 10460 Bubb Rd., Cupertino, California 95014.

CIRCLE INQUIRY NO. 213

Traffic Analysis System

An automated traffic engineering management system providing computational, analytical and graphics capabilities is available from Atems Computer Systems. The Atems-85 microcomputer-based turnkey system features three software packages for traffic signal systems management: Comprehensive Analysis Program for Single Signalized Intersections (CAPSSI-I), PASSER II and



TRANSYT 7. Also available are programs for word processing and speed zone survey analysis. The system is configured around an Intel 8085A microprocessor with 64K RAM main memory and 500KB of disk storage, a Qume daisywheel printer and Hazeltine 1520 CRT with standard ASCII keyboard. Contact: Atems Computer Systems, 2565 E. Chapman Ave., Suite 124, Fullerton, CA 92631.

CIRCLE INQUIRY NO. 214

Cabinet Computer

A computer in a single cabinet is available from Chrislin Industries, Inc. The CI-103 includes a DEC VT100 video terminal, LSI 11/2 or 11/23 CPU and 64K bytes to 256K bytes of high speed



memory. The system is housed in a 14½ x 18 x 14¼ inch cabinet and has a detached typewriter-like keyboard. The DEC RX02 one megabyte floppy disk system or a 10 megabyte cartridge system is offered as an option. Contact: Chrislin Industries, Inc., 31352 Via Colinas, Suite 102, Westlake Village, CA 91361.

CIRCLE INQUIRY NO. 215

Control Function System

B.I. Inc. has introduced the 8085 microprocessor-based DAQ-800 single board computer. It features 16 analog input channels (8-bit resolution), 4K or EPROM (2716), 4½K of static RAM, 2 serial I/O ports (EIA RS-232), 44 parallel I/O lines (8155) and 2 timers. The system is suitable for such industrial control and data acquisition applications as heating and cooling controls, process controls, alarm systems and motor controllers. The unit measures 7 x 9 inches and requires +5V at 1.5 A and ±12V power supplies. A supplied PROM-resident monitor program provides many common debugging features including single-step operation. Contact: B.I. Inc., 1906 13th St., Suite 104, Boulder, CO 80302.

CIRCLE INQUIRY NO. 216

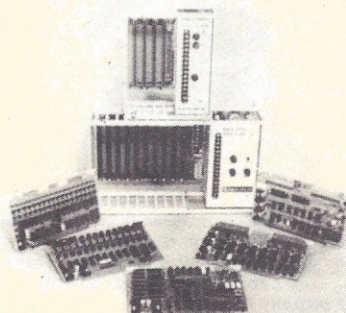
Business Computer System

Microtech Business Systems has introduced System 100, a small business computer system featuring a 10 megabyte disk drive. A sub-microsecond processor with 64K bytes of RAM occupies only one position in the front-loading chassis. The system is compatible with all Microtech systems. The basic configuration includes: two video ports (one for expansion); a 24 x 80 character, upper and lower case, dual-intensity video display with full keyboard; and a high speed bi-directional matrix printer. Integrated into a flexible desk unit, it can be expanded to include 128K bytes of memory, multiple terminals and printers. The software is IRIS operating system with Business BASIC. Contact: Microtech Business Systems, 3176 Pullman St., Suite 108, Costa Mesa, CA 92626.

CIRCLE INQUIRY NO. 221

Industrial Environment Micro

Datatron Labs, Inc. has introduced the PC-744 Series microprocessor-based controller, a rugged piece of industrial equipment designed for that environment. The system interfaces with heavy duty controls such as limit switches, pushbuttons and solenoids. Input and output devices are optically coupled to the logic section and interfaced to the



user's process by barrier-type terminal blocks. The controller is supplied either with the user's program debugged and stored in ROM or unprogrammed. Features include an 8-bit 6800 microprocessor along with 4K of RAM and 8K ROM and an RS232 serial port. Contact Datatron Labs, Inc., P.O. Box 384, Sussex, NY 07461.

CIRCLE INQUIRY NO. 217

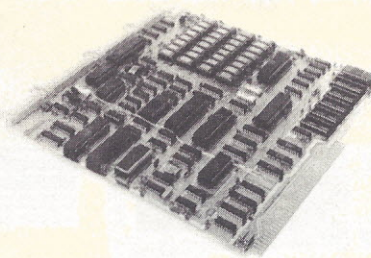
Multi-User/Multi-Tasking Systems

Taurus Research, Inc. has made available a multi-user/multi-tasking system based upon the Zilog Z8000 16-bit CPU. The Taurus T8000 series supports up to 48 users, and hard disk capacity of up to 640 megabytes of storage using Winchester type disks. The entry level system T8000/2 includes two double sided/double density floppy disk drives and two serial ports. It is fully expandable and allows the addition of serial I/O ports and hard disk drives. The mid-level system T8000/40 includes 8 serial I/O ports, a 40-megabyte hard disk, and a single double density/double sided floppy disk drive for backup and is also expandable. The multi-user operation system TOS performs such multi-user environment functions as print spooling to multiple printers, security with multiple priority levels, user time accounting, and system status. Included with the operation system is an assembler, text editor, utilities and a BASIC language which contains a sort function and ISAM file handling. A complete line of application programs is available, including general ledger, accounts payable, accounts receivable, payroll, statistics, plotting, financial programs and a mailing list system. Hardware options available include hard disk drives in the 10, 20 or 40 megabyte sizes, a 6-port serial I/O board and an RS-232 to bisync converter board. Contact: Taurus Research, Inc., 2880 S. Main St., Suite 220, Salt Lake City, Utah 84115.

CIRCLE INQUIRY NO. 222

8-Bit Computer with Options

The TCB-85E is a single board computer that offers the option of 64 Kbytes of RAM and can accommodate the Intel 8085A-2 10-megahertz CPU on one printed circuit board. The system is an 8-bit computer containing all necessary inter-



faces to communicate with operators, other computers, mass storage facilities and peripherals. Functions include business, scientific and text processing uses supported by Pascal software and the CP/M operating system. Contact: DOSC, Inc., 175 I.U. Willets Rd., Albertson, NY 11507.

CIRCLE INQUIRY NO. 218

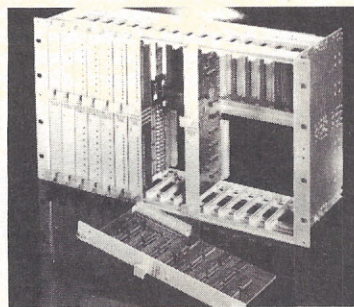
Scientific/Business Systems

A micro based on the 16-bit TI9900 CPU and the S-100 bus is available from Interface Technology. Two versions are presented; both feature a 9900 16-bit CPU by Marinchip Systems, 32K bytes of memory, and two 8-inch floppy disks. Included are a disk operating system, BASIC, word processor software, editor, assembler, linker, and utilities. The scientific machine features Pascal and a floating point package. The business version substitutes extended commercial BASIC, general ledger, accounts payable and receivable, and payroll. A network operating system for multi-user environments is available. The system is complete in one cabinet with power supply, fan, and power line filter. Contact: Interface Technology of Maryland, Box 745, College Park, MD 20740.

CIRCLE INQUIRY NO. 220

Industrial Functions System

The Series 990E 16-bit microcomputer system introduced by Erni & Co., offers 20 digital and analog interface boards for the industrial OEM or end user. It is designed for such applications as process control, industrial equipment and machine control and quality control monitoring test instrumentation. Compatible with TI's 990 series micro/minicomputers and 5T1 programmable controllers, it provides a TMS-9900 bit,



byte and word-oriented CPU and is fully expandable to 4096 I/O lines in up to 8 chassis. A programmer's test console and standard software are available. The compact aluminum chassis fits a standard 19" relay rack and includes the mother board with 16 slots for system boards. Each board is pre-connectorized and securely fastens to the chassis. Separate bus and I/O connectors prevent electrical or programming mishaps. Contact: Erni & Co., 3316 Commercial Ave., Northbrook, IL 60062.

CIRCLE INQUIRY NO. 219

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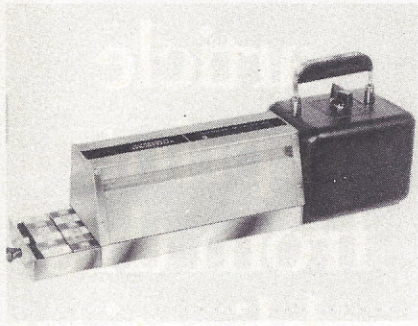
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MISCELLANEOUS

EPROM-Erasing UV Lamps

The Spectroline PR-125T erases up to 16 EPROM chips, and the PR-320T erases up to 36 chips — in as little as 7 minutes. Both lamps feature an ultra-high intensity, ozone-free grid tube and a specular reflector to provide uniform UV distribution. A conductive foam pad holds the



chips in place during exposure and prevents electrostatic build-up, while protecting the chips from possible static charge. A 60-minute timer is included for automatic shut-off. Contact: Spectronics Corp., 956 Brush Hollow Rd., Westbury, New York 11590.

CIRCLE INQUIRY NO. 223

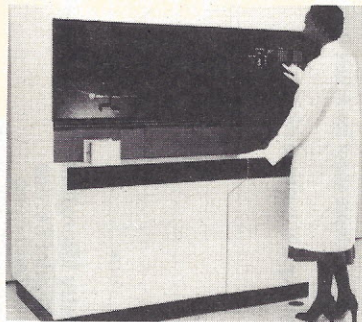
Wang Typesetting Enhancement

Wang Laboratories has added an enhancement to its Photocomposition Systems, allowing users to preview the formatted copy before typesetting on photographic paper. Called Workstation Hyphenation and Justification, it displays exact line ending and hyphenation decisions made by the typesetter, point size and leading specifications of the text, and error messages indicating incorrect typesetting commands on an Office Information System workstation screen. Users can modify typesetting decisions and make changes or edit prior to producing final galley copy. An exact duplicate of the screen copy can be made on Wang's line or character printers. Additional typesetting commands and utilities are also available to further simplify the typesetting process. Contact: Wang Laboratories, Inc., One Industrial Ave., Lowell, MA 01851.

CIRCLE INQUIRY NO. 224

Inline Sideways Sputter System

The Model 3180 Sputter Coater by Varian can sputter 1 micron A1 or A1 alloy coating onto 60 100-millimeter wafers per hour, with operator wafer handling eliminated. By automatically coating one wafer at a time, the system delivers process repeatability and improved control of wafer diagnostics. Key features are a cassette-to-

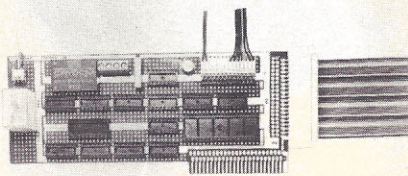


cassette wafer handler, rotary inline indexer, vertical magnetron S-Gun module for sideways sputtering, microprocessor control and test system with CRT display, load-lock area restricted to 250 cc, positive-pressure nitrogen system, and a fully automated cryopumped system. Contact: Varian Corp., Vacuum Div., 611 Hansen Way, Palo Alto, CA 94303.

CIRCLE INQUIRY NO. 225

Expandable I/O Boards

The Vector Electronic 4609 peripheral interface board is compatible with Apple II and Superklim microcomputers without an adapter unit, and with the PET with an adapter. The boards have provisions for three additional types of input/output connectors, extended board area and dual heavy-duty power buses between the DIP IC

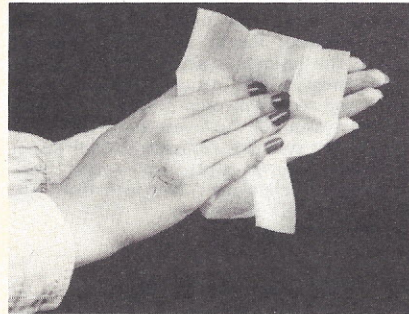


leads for easy, short bus connections. The 4609 is designed for construction of special control, communications, peripheral or memory interface circuits using support devices from major semiconductor manufacturers. It also serves for breadboarding experimental circuits. Contact: Vector Electronic Co., 12460 Gladstone Ave., Sylmar, California 91342.

CIRCLE INQUIRY NO. 226

Computer Room Cleanup

Texwipe developed the Ink-Off and cleaning towelette for cleanup in computer rooms and word processing departments. Ink-Off removes ink and carbon stains from changing computer

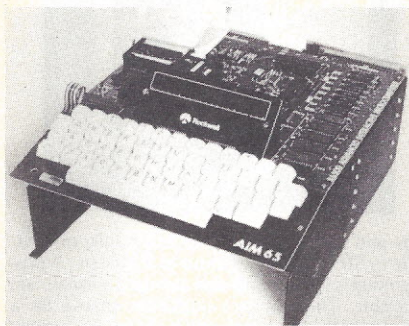


printer ribbons, servicing equipment or handling multiple continuous forms. Contact: The Texwipe Co., P.O. Box 278, Hillsdale, NJ 07642.

CIRCLE INQUIRY NO. 227

Card File with Motherboard

The MTU K-1005A-A Card File serves as a compact mechanical support and electrical connection system for the Micro Technology Unlimited AIM-65 computer. It integrates the computer, keyboard, and a series of expansion boards into one compact, portable unit. Drawing no power, the unbuffered motherboard utilizes the



AIM bus structure to carry expansion connector signals to up to four additional boards. A fifth undedicated position is provided for a board not on the bus. Contact: Micro Technology Unlimited, 841 Galaxy Way, Box 4596, Manchester, New Hampshire 03108.

CIRCLE INQUIRY NO. 228

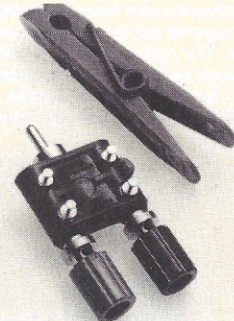
Bubble Memory Explained

A color videotape shows microscopic views of a million-bit magnetic bubble memory device's internal operation, and how the device is constructed and used with other components in a microcomputer memory system. Intel Magnetics produced the videotape to explain the new memory technology. The five-minute tape shows the construction of Intel's 7110 magnetic bubble memory device. Then it shows how the bubbles are formed in the device's magnetic film, controlled by a magnetic field, and manipulated with other elements so data can be stored, shifted and read. Contact: Intel Corp., Literature Dept., 3065 Bowers Ave., Santa Clara, CA 95051.

CIRCLE INQUIRY NO. 229

Banana Plug Adapter

ITT Pomona Electronics 4728 adapter: two binding posts to an RCA phono plug adapter, permits single or double banana plugs to be used with an RCA phono jack. The unit is isolated, with gold flashed solder turrets, allowing permanent,



noise-free addition of components for series/parallel compensation networks. The binding posts are on 19.05 mm centers with 4.22 mm diameter banana jacks. Contact: ITT, 1500 E. 9th St., Box 2767, Pomona, CA 91766.

CIRCLE INQUIRY NO. 230

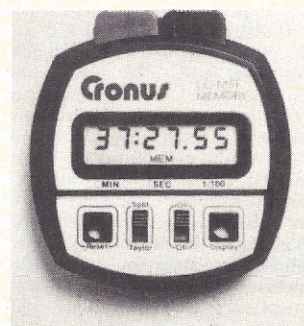
Magnetic Tape Maintenance

The Kybe 8500 for maintaining and evaluating computer tapes is capable of cleaning, retensioning, removing static charge and testing a 2400' reel in 9 channel 1600 bpi and 6250 bpi formats in four minutes. The system counts and charts one, two and three track dropouts computer correlated at low, nominal or critical levels so users can tell which tapes are safe for critical runs, which should be stripped and which should be discarded. Contact: Dennison Kybe Corp., 132 Calvary St., Waltham, MA 02154.

CIRCLE INQUIRY NO. 231

Timer for Athletic Events

The Cronus LC-MST is a memory stopwatch that can remember four individual times plus the total event time. This quartz-crystal electronic timer features a large liquid crystal display, 5-year battery life, and single action logic. The stopwatch



recalls up to four splits or laps plus the events' total time to 1/100 second. The water-tight unit comes with neck lanyard and velcro wriststrap for hands-off timing. Contact: Cronus Precision Products, Inc., 2895 Northwestern Pkwy., Santa Clara, CA 95051.

CIRCLE INQUIRY NO. 232

Equipment Covers

Cover Craft custom makes static-free vinyl protective covers in any size or shape. Logo or artwork can be imprinted. The covers fit snugly over equipment to protect against dust, dirt and liquid.



Applications include computers, office and laboratory equipment, stereo components and CBs. Contact: Cover Craft, Columbia Dr., P.O. Box 555, Amherst, NH 03031.

CIRCLE INQUIRY NO. 233

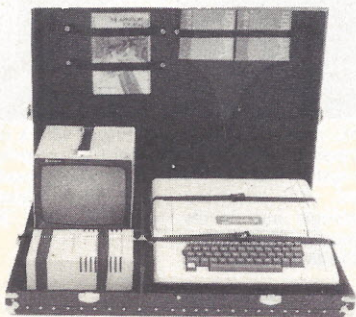
High Speed Tape Drive

The Microstreamer tape drive offers the option of employing a streaming mode to load or unload data on-the-fly at a 100 inch per second speed, or of using the 25 inch per second operating mode to read or record data interactively. It can be used for archival storage, data transfer, primary data storage and emergency backup storage. Contact: Cipher Data Products, Inc., 10225 Willow Creek Rd., San Diego, CA 92131.

CIRCLE INQUIRY NO. 234

Computer Carrying Cases

Computer Textile, Inc. is marketing computer system carrying cases for the Apple and TRS-80. The TRS-80 case contains room for the keyboard module, expansion interface, two disk drives, power strip, two boxes of diskettes and manuals. The Apple case contains room for the computer, 9" Sanyo monitor, two disk drives, power strip,



two boxes of diskettes and manuals. Cases are finished in black vinyl with metal reinforced corners, and lined with foam rubber covered with black velveteen. The cases are configured so the system may be operated in the case. Contact: Computer Textile, Inc., 10960 Wilshire Blvd., Suite 1504, Los Angeles, CA 90024.

CIRCLE INQUIRY NO. 235

Telephone Management System

The Comm-Stor/SMR unit is a floppy-disk based telephone management system that records information on calls made through telephone systems. It assigns costs to the call records via the pricing techniques used by telephone companies. Costs are then allocated by extension, department or account. With Comm-Stor's interactive inquiry/response program, equipment and facilities configuration can be optimized and telephone system misuse can be pinpointed. The unit will operate with PBX systems manufactured by Western Electric, Rolm, GTE, Mitel, Siemens, Plessey and General Dynamics. Contact: Sykes Datatronics, Inc., 375 Orchard St., Rochester, NY 14606.

CIRCLE INQUIRY NO. 236

Automobile Protection

A vehicle security system from Radio Shack alerts the user to attempted theft or tampering by means of a remote pocket-size receiver. The Archer Mobile Alert consists of a coded radio transmitter, pocket receiver with belt clip, and two electronic sensors. Additional switches or sensors



may be added to the system for greater protection. The system can be adapted for use in monitoring building openings, gates, wall safes, store rooms, drawers, cabinets, luggage and brief cases. Contact: Radio Shack, 1300 One Tandy Ctr., Fort Worth, TX 76102.

CIRCLE INQUIRY NO. 237

MODEMS

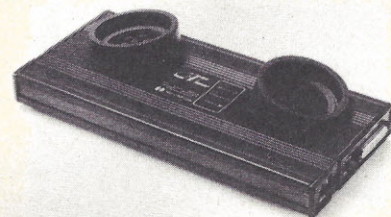
High Performance Modem

A new lightweight modem that meets the communications requirements of CCITT countries has been developed by Commodore Business Machines, Inc. The device is suited for use in Europe since international frequencies are available. A switchable four-section bandpass filter provides out-of-band rejection, assuring accurate processing of the input from received carrier, even at signal level of less than -47 dBm. Jitter-free data is possible by a soft limiter and the phase lock loop discriminator. The carrier detect circuitry prevents the modem from operating when excessive noise would produce errors or cause marginal operation. This feature also assures accurate teleprocessing connections and inhibits chatter when the received signal fades. Contact: Commodore Business Machines, Inc., 3330 Scott Blvd., Santa Clara, CA 95051.

CIRCLE INQUIRY NO. 238

Low-Profile Modem

An acoustic modem weighing only 1.5 lbs. and designed specifically for the personal and small computer market has been developed by Novation. The CAT 300 baud answer/originate modem is engineered to transmit data over telephone lines, is Bell 103 compatible, and has an AC wall-mount transformer. It features switches for mode selection and operation, as well as LEDs



for displaying unit status. Acoustic self-test is standard. The compact powerpack plugs directly into wall sockets, reducing heat and voltage hazards in the unit. There are no dangerous internal voltages. The unit is designed to let an individual work at home and talk by phone to his office computer. Contact: Novation, Inc., 18664 Oxnard St., Tarzana, CA 91356.

CIRCLE INQUIRY NO. 240

Multiplexer Services 64 Lines

Computer Communications CC-8R remote concentrator offers end users access to an advanced networking environment. The unit features a 256K byte memory base with 16K chips and dual-sided floppy disk support. It services a total of 64 lines, including synchronous and asynchronous lines and network link lines. The software offers users full networking advantages with compatibility for emulation products. Features include an automatic dump and reload capacity in the event of a system fault, as well as line, system and network statistical storage to facilitate monitoring and future system planning. A remote program loading (RPL) capacity makes it possible for the CC-8R to run unattended. Program modifications can be issued from a controlling location within the network by the RPL device. Contact: J.B. Talmadge & Co., 6660 Reseda Blvd., Reseda, CA 91335.

CIRCLE INQUIRY NO. 239

Computing Via Telephone

Universal Data Systems 103 LP is a Bell-compatible Model 103 modem that enables digital devices (computers and/or interactive terminals) to communicate with each other via the analog facilities of the public telephone network. The unit allows full-duplex data communication over an ordinary two-wire telephone circuit at speeds up



to 300 bits per second. It is a logical replacement for the acoustic couplers now in use on many systems since it reportedly offers improved data integrity. Three snap-in connections transform a telephone into a data set in a matter of seconds. Contact: Universal Data Systems, 5000 Bradford Dr., Huntsville, AL 35850.

CIRCLE INQUIRY NO. 241

Modem with LEDs

The Daterc 212 provides full duplex transmission and reception of serial binary data at either 0-300 bps asynchronous or 1200 bps asynchronous/synchronous over the switched network. It is compatible with Bell 100 series modems, the Bell 212A and any modem compatible with them. Four test buttons permit seven diagnostic

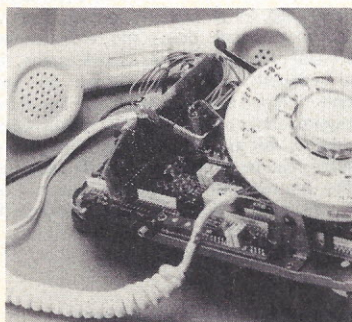


tests of the entire communications network. Features include two LEDs, one which indicates the modem is automatically receiving an incoming call, the other indicates a carrier tone has been received and a communication link established. Contact: Daterc, Inc., 300 E. Main St., Carrboro, NC 27510.

CIRCLE INQUIRY NO. 242

Invisible Modem

A switched network 300 bps full duplex Bell 103/113 compatible modem, housed inside a standard telephone, is available at Racal-Vadic. Users plug the VA103 ModemPhone—with its build-in, FCC registered direct-connect, originate/answer modem—into a standard telephone company video jack or programmable data jack,



connect the data terminal and start communicating. The modem comes equipped with an 8-foot cable and plug, plus a 25 pin connector to accept the RS232C interface from the terminal. It is designed to mount inside a rotary or touch-tone telephone. Contact: Racal-Vadic, 222 Caspian Dr., Sunnyvale, CA 94086.
CIRCLE INQUIRY NO. 243

PERIPHERALS

Statistical Multiplexer

Gandalf Data, Inc. offers the S-MUX 9103 statistical multiplexer for data communications. It features high-speed processing, direct memory access and both 16K of RAM and 16K of ROM. An adaptive line protocol provides for 115% efficiency under heavy load conditions, with 25 millisecond throughput delay under light load conditions. The unit can be configured in an 8-channel stand-alone version or in increments up to 32 channels per rack-mount configuration. It automatically performs statistical collection of traffic volumes, error events, buffer usage and similar data. Contact: Gandalf Data, Inc., 1019 S. Noel, Wheeling, IL 60090.
CIRCLE INQUIRY NO. 244

Mini Disk and Controller

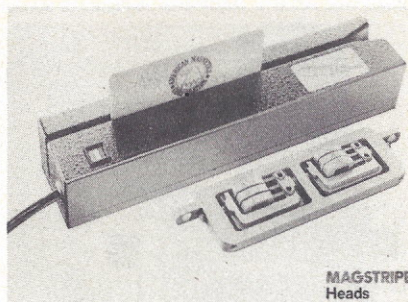
The 2000/10 is a microprocessor controlled mini disk and controller that plugs into Teletype Model 43s, TI Silent 700s and similar typewriter terminals. The system can operate either as a stand alone word processor or as an on-line, storage, edit and forward unit. Software package includes global search and global replace commands. In the on-line mode, data can be transferred in blocks to and from a remote computer at switch selectable speeds up to 9600 baud. It can be invisible to the host computer in the on-line mode. Contact: Terminal Data Corp. of Maryland, 11878 Coakley Cir., Rockville, MD 20852.
CIRCLE INQUIRY NO. 245

Pen Measures Light

Aresco, Inc. has available the Lipson Light Pen, a tool for educational, scientific and recreational uses. The pen is packaged with twelve BASIC programs on cassette tape, a 48-page manual, cable and a connector to PDL(0) on the Apple II. The demonstration programs (six in Integer BASIC, six in Applesoft) are made to be incorporated into programs designed by the user. The manual is intended to instruct the user in the methods of detecting and measuring light. All the demonstration programs are listed in the manual, along with tutorial comments and suggestions for programs to be designed by the user. The pen utilizes a cadmium selenide cell for light detection, enabling the user to detect and measure varying intensities of light. Contact: Aresco, Inc., P.O. Box 1142, Columbia, MD 21044.
CIRCLE INQUIRY NO. 248

Card Reader Also Writes

American Magnetics Corp. offers an addition to its Magstripe card readers. The Model 44 Encoder/Reader has a "write" capability. The unit is said to read warped and contaminated cards with low output and out-of-spec jitter. Each head



is independently suspended on parallelogram springs in a gimbal mount. Low contact force causes minimum head and card wear. Contact: American Magnetics Corp., 2424 Carson St., Torrance, CA 90501.
CIRCLE INQUIRY NO. 246

Thermocouple to Replace Multiplexer

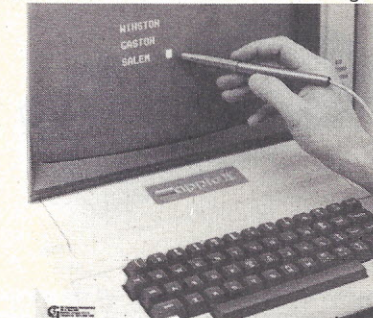
Two isolated, solid state, four-channel thermocouple/mV and high level signal conditioners by Analog Devices are designed to replace flying capacitor multiplexers in industrial data acquisition systems. The 2B54 is intended for use with thermocouples and other transducers which produce outputs from $\pm 5\text{mV}$ to $\pm 100\text{mV}$. The



2B55 is intended for use with 4 to 20mA current loop signals and voltage spans from $\pm 50\text{mV}$ to $\pm 5\text{V}$. Both models provide a complete interface between transducers and analog-to-digital converters with greater scanning speed, and accuracy. Contact: Analog Devices, Inc., Box 280, Rte. 1 Industrial Park, Norwood, MA 02062.
CIRCLE INQUIRY NO. 247

Light Pen for Apple II

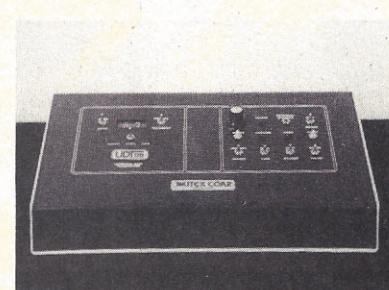
The 3-G is a self-contained light pen which plugs directly into the Apple. The pen makes it possible to bypass the Apple's keyboard and interact directly with the information displayed on the CRT screen. A "menu" can be displayed and the user can make a selection with the light pen.



It comes assembled and ready to plug into the Apple game paddle port. A demonstration game cassette, sample program and complete programming instructions are included. No batteries are needed. Contact: 3G Co., Inc., Rt. 3, Box 28A, Gaston, OR 97119.
CIRCLE INQUIRY NO. 249

Data Converter/RTTY Terminal

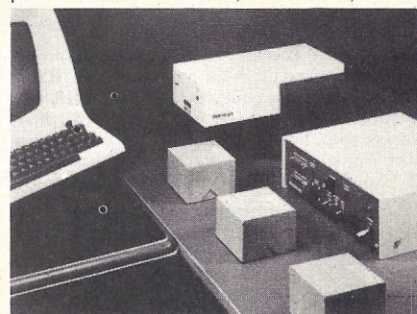
The Xitex Corp. UDT-170 Universal Data Transceiver connects directly between the user's ASCII or Baudot teletype or video terminal and the station transceiver. The unit is a combination microprocessor based data converter plus high performance RTTY terminal unit. In the receive mode, the unit takes the RTTY or Morse signal from the receiver audio output and converts it to a



DC signal which is fed to the data converter. In the transmit mode, the serial output signal from the keyboard is fed into the data converter where it is buffered and regenerated in the desired output mode and data rate. Contact: Xitex Corp., 9861 Chartwell Dr., Dallas, TX 75243.
CIRCLE INQUIRY NO. 250

Decoding with Scanner

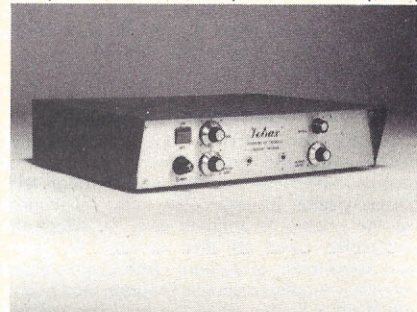
A laser bar-code scanning system, the Metroscan MS106 is designed for fast data acquisition in materials-handling applications. It is plug compatible with light-pen systems and gives accurate, high-speed scans. The unit's microcomputer decodes CODABAR, UPC A or E, or other



codes, manages data and interfaces with a data-processing system and optional CRT or printer. The system has a connector for a plug-in modem board and selectable baud rates. Contact: Metrologic Instruments, Inc., P.O. Box 307, Bellmawr, NJ 08031.
CIRCLE INQUIRY NO. 251

Voice Synthesizer

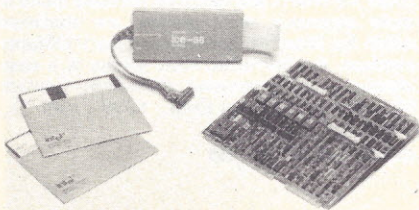
The Model VSB from Votrax is a low-cost single circuit board unit capable of generating an unlimited vocabulary in seven languages. Words are generated by a series of electronic commands that produce the various phonemes comprising



human speech. It requires eight parallel data bits to create each phoneme, six for phoneme selection and two for inflection. Each 8-bit command selects one of 63 phonemes which generates the vocal sound desired. Contact: Votrax, 500 Stephenson Hwy., Troy, MI 48084.
CIRCLE INQUIRY NO. 252

In-Circuit Emulator

Intel Corp. has developed an in-circuit emulation module for the Intel 8088 8-bit microprocessor. ICE-88 hardware links the Intel microcomputer development system with the user's system through a buffer box that replaces the



8088 CPU during debugging and testing. Combined with the 8086/8088 software development package, the emulator provides powerful commands which control the debug session. Contact: Intel Corp., 3583 S.W. 198th Ave., Aloha, OR 97005.

CIRCLE INQUIRY NO. 253

POWER SUPPLIES

Portable Power for Apple

Powermaster is a portable power supply for the Apple II that supplies all required voltages to run the computer for hours without recharging. It has enough reserve capacity to run the Apple with all peripheral slots full including a floppy disk controller. The system plugs into the motherboard and connects to any standard 12V automobile battery. Connection can be with an auto cigarette lighter adapter or with connecting clips. Contact: Rainbow Computing, Inc., 9719 Reseda Blvd., Northridge, CA 91324.

CIRCLE INQUIRY NO. 254

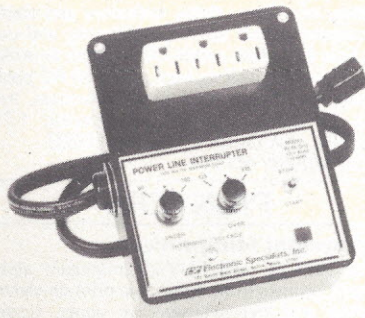
Convection Cooled Switcher

The 5J5 W open-frame switcher incorporates a proprietary heat-sinking arrangement. This eliminates the massive hardware in power supplies operating in the power ranges required by memory systems. Features include logic-inhibit input, remote voltage-adjustment and power-fail output plus four LEDs to indicate if AC or DC power is on and whether the unit is locked out due to an overtemperature or overvoltage condition. The unit has remote-sense and adjustment provisions. Contact: Sierracin/Power Systems, 20500 Plummer St., Chatsworth, CA 91311.

CIRCLE INQUIRY NO. 256

Safety Device

Electronic Specialists has the Power Line Interrupter that disconnects power from controlled apparatus should AC line voltage be disrupted or exceed user selectable limits. Front panel controls provide voltage interrupt level selection and

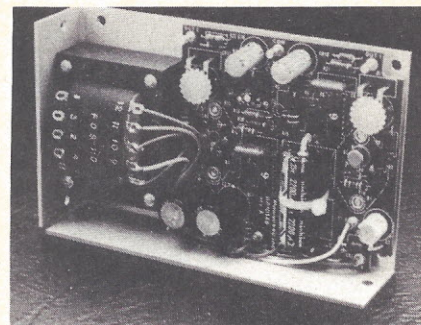


power reset. Intended for microcomputer applications with equipment subject to periods of unattended operation, it provides safety and protection for equipment and personnel. Contact: Electronic Specialists, Inc., 171 S. Main St., Natick, Massachusetts 01760.

CIRCLE INQUIRY NO. 255

Mini Floppy Disk Power Supplies

Powertec has introduced the FD Series of mini floppy disk, dual output power supplies. Model FD101 is the first unit in the series, delivering up to 55% efficiency with main channel outputs of +5V at 0.75 amps and secondary channel out-



puts of +12V at 1.8 amps. The FD101 offers flexible strap selectable inputs of 103-127/206-254 VAC, single phase 47-440 Hz. Features include overload, short circuit and reverse voltage protections and no turn-on/turn-off overshoot. Contact: Powertec Inc., 20550 Nordhoff St., Chatsworth, CA 91311.

CIRCLE INQUIRY NO. 257

Paddleboard Connector Featured

The Model FDF power supply features a built-in paddleboard connector with 17 double-ended feed-thrus to facilitate interconnection with any Shugart or compatible 5 1/4" floppy drive. It permits jumper modification of drive address lines external to the drive itself. With an AMP-type connector, outputs of +12VDC at 1 A and +5VDC at 700 mA are provided. OVP is optional. Contact: Semiconductor Circuits, Inc., 218 River St., Haverhill, MA 01830.

CIRCLE INQUIRY NO. 258

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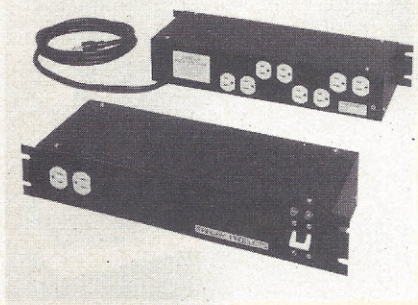
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Dahlienstr. 4, D-8011 Munchen-Vaterstetten, West Germany

Power Distribution/Control Unit

Marway Products' MPD Power Controllers can provide clean, filtered power to up to ten devices from a single AC outlet. The 110/220 series for 15-amp systems is a compact, rack-mountable unit providing ten AC receptacles—eight switched

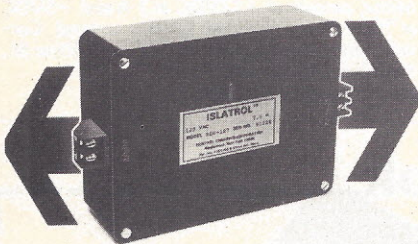


and two direct. The unit features a dual section EMI filter and magnetic circuit breakers to provide fast, accurate and temperature-stable load protection. Contact: Marway Products, Inc., 2421 S. Birch St., Santa Ana, CA 92707.

CIRCLE INQUIRY NO. 259

Bi-directional Power Line Filter

The Islatrol BDUs filter spikes and transients in both directions simultaneously and provide protection with greater than 55 db of attenuation. The BDU can protect sensitive equipment from incoming power line disturbances, from equip-

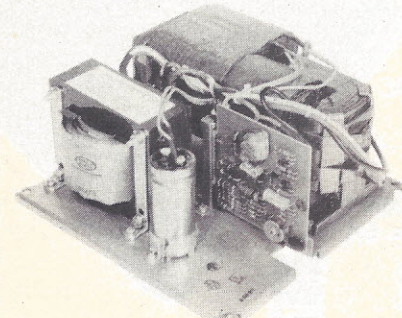


ment sourcing disturbances back into power line and for simultaneous protection on input and output lines. Contact: Control Concepts Corp., 333 Front St., Binghamton, NY 13905.

CIRCLE INQUIRY NO. 260

AC Line Conditioner

The Model C474 UL open frame AC line conditioner is for systems where unstable voltage and frequency conditions exist. The unit provides 2,000 VA of regulated and filtered power from a 90-130 VAC source. It provides regulation of $\pm 1\%$ for line changes and $\pm 1.5\%$ for load

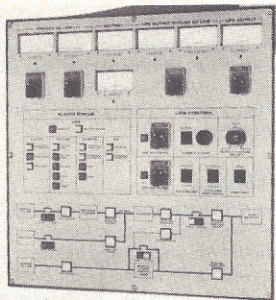


changes of 25% to 100% load. The unit also provides regulation and filtering, supplies high surge current ratings, had no semiconductors in the AC path and is U.L. recognized for use in data processing equipment, office appliances and business equipment. Contact: Adtech Power, Inc., 1621 S. Sinclair St., Anaheim, CA 92806.

CIRCLE INQUIRY NO. 261

Uninterruptible Power Source

Utilizing 12-step pulse width modulation for improved efficiency, the Sola Electric uninterruptible power source systems are for use with large mainframe computers, industrial process controls and large-scale electronic equipment applications. The expanded operator control panel offers



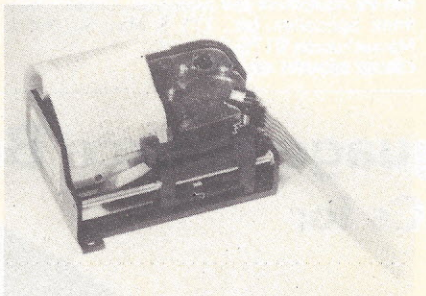
an array of meters, status indicators and alarms for comprehensive system monitoring and control. Sola also offers a mini-UPS system to protect small electronic devices from common AC power problems including blackouts, brownouts, transients and noise. Contact: Sola Electric, 1717 Busse Rd., Elk Grove Village, IL 60007.

CIRCLE INQUIRY NO. 262

PRINTERS

Lightweight Miniprinters

The EUY-2E and EUY-2T miniature alphanumeric printers from Panasonic print on electro-sensitive and thermally-sensitive paper, respectively. Both print 7x5 dot matrix, 15 characters per line, 7x5 dot matrix. The electrosensitive unit can print 2 lines per second while the thermal unit

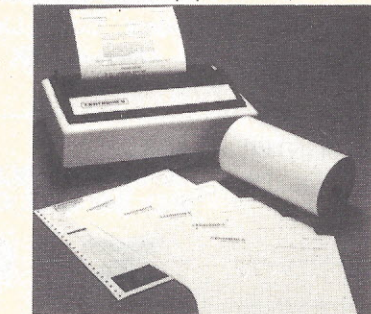


prints at 1.5 lps. Both measure 72 mm wide, 33.5 mm high, and 56 mm deep and print on 36 mm wide paper, with an expected life of 5×10^5 lines. Contact: Panasonic Co., Elec. Comp. Div., One Panasonic Way, Secaucus, NJ 07094.

CIRCLE INQUIRY NO. 263

Letter-Quality Printer

The Model 737 produces correspondence-quality printing for text and data processing. Features include high-quality dot matrix print, right margin justification, proportional spacing, forward and reverse paper motion, and three-way



paper handling. The unit prints 7x8 dot matrix characters at 10 and 16.5 characters per inch and generates Nx9 dot matrix characters in the proportional character spacing used for data and text processing. Contact: Centronics Data Computer Corp., Hudson, NH 03051.

CIRCLE INQUIRY NO. 264

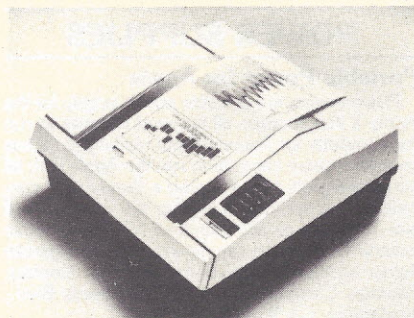
Low Cost Serial Printer

MicroPro offers a file management/versatile S-100 interface/low cost printer package designed for use with CP/M and MP/M compatible microcomputer configurations. Being combined are the MicroPro WordStar word processing software, the I/O Master interface board, and the 55 cps NEC Spinwriter parallel printer. Because the drivers and functions normally found in more expensive serial printers are contained within the WordStar software and the I/O Master interface, the MicroPro/NEC system is a cost-effective word processing alternative. Contact: MicroPro International Corp., 1299 Fourth St., San Rafael, CA 94901.

CIRCLE INQUIRY NO. 265

Hard Copy Devices for OEMs

The V-80 series is a generation of desktop hard copy output devices designed for integration into OEM computer, office equipment and instrumentation systems. The V-80 prints 1000 132-column lines per minute. It is also a high speed, high resolution $8\frac{1}{2} \times 11$ inch plotter with 200 dot-per-inch resolution in seven seconds.



With optional controller, it can produce a hard copy from CRT or video source in twenty seconds or less. A differential paper sensor determines top of page for fan-fold, end of roll and out of paper. Contact: Versatec, 2805 Bowers Ave., Santa Clara, CA 95051.

CIRCLE INQUIRY NO. 266

Band Printer

The LP25 band printer prints 285 lines-per-minute and allows self-diagnostics. The LP25-AA has a 64 ASCII character set. The LP25-BA features user replaceable fonts, and up to three map PROMs can be co-resident. An optional 96 ASCII character set can be added. Optional bands are available to print lines of 15 characters per inch rather than the standard ten characters. This



enables line printer output formats on $8\frac{1}{2}$ -inch wide paper. Additional bands for European and Japanese character sets are also available. The printers feature a universal power supply that is jumper-plug adjustable. Internally generated diagnostic readouts reduce maintenance costs. Contact: Digital Equipment Corporation, Maynard, MA 01754.

CIRCLE INQUIRY NO. 267

96-Character Printers

The DIP-80 and DIP-84 low cost dot matrix printers feature 100 cps, 7x7 matrix, and upper/lower case 96-character ASCII set. The DIP-84 features software selectable 80, 96 or 132 columns per line and 6 or 8 lines per inch. Also, the



DIP-84 has a forms tractor. Both units are available in either RS232C or Centronix compatible parallel interface. Contact: Computer Textile, Inc., 10960 Wilshire Blvd., Suite 1504, Los Angeles, CA 90024.

CIRCLE INQUIRY NO. 268

New Okidata Printers

Okidata offers three matrix printers, two additions to the Microline series and the Slimline series graphics unit. The Slimline provides a choice of two dot densities for alphanumeric printing with 100 x 100 graphics capability. The unit prints routine reports at 400 lpm with a low density pattern and switches to a high density pattern to print correspondence at 120 lpm. Microline II and III contain two motors and operate continuously with no duty cycle limitations. Bidirectional, short line seeking mechanisms produce 9x7 characters on standard one, two and three part forms. Contact: Okidata Corp., 111 Gaither Dr., Mt. Laurel, NJ 08054.

CIRCLE INQUIRY NO. 269

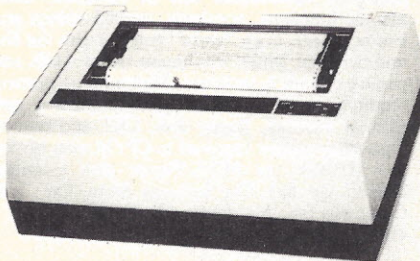
Expandable Keyboard Terminal

The Model 825 Keyboard Send-Receive (KSR) terminal is a 75 cps addition to the Omni 800 family. The unit can be optionally upgraded to print 150 cps. The 825 KSR has a full ASCII character set and produces an original and up to three copies. Standard features include a 132-column adjustable carriage, and operator programmable printing selection of six or eight lines per inch. The bidirectional printing unit is suitable for use as a time-sharing terminal or input-output computer console. Contact: Texas Instruments, P.O. Box 1444, M/S 7784, Houston, TX 77001.

CIRCLE INQUIRY NO. 270

Color Matrix Printer

The 454C is a three color, microprocessor-controlled bidirectional serial matrix printer. The unit prints 250 cps with a single print head on a 9x9 matrix. Maximum line length is 155 characters. Standard character font is to ECMA-42.



Custom characters available. Principle application is in color VDU dumping. Shifting the three-color striped ribbon ensures maximum throughput. Contact: Integrex Ltd., Portwood Industrial Estate, Church Gresley, Burton on Trent, Staffordshire DE11 9PT England.

CIRCLE INQUIRY NO. 271

Label Printing System

The X4600 electronic label printer with a built-in microprocessor is designed to print mixed characters from 1/10-inch to 12.7-inches and all standard bar codes. The printer interfaces with various computer systems without the need for special terminals. It features simplified program-



ming and takes only six key strokes to program a character. The printer is rated at 300 lpm, 132 characters per line and 10 characters per inch, 9x7 matrix. Features 96 character set, plot mode of eight lines per inch, double height and under-line characters. Contact: Wallace Business Forms, Inc., 4600 W. Roosevelt Rd., Hillside, IL 60162.

CIRCLE INQUIRY NO. 272

Document/Slip Printer

The Model 400 is a 40-column dot matrix impact document printer with full ASCII upper/lower case character set. The unit prints bidirectionally in a 5x7 dot matrix at three lines per second. Parallel, Centronics compatible or TTL, and serial TTL, TTY 20mA current loop of EIA RS-232-C at baud rates from 110 to 9600 are the standard inputs which can be specified. Contact: Interface Electronics, 24 Denby Rd., Allston, MA 02134.

CIRCLE INQUIRY NO. 273

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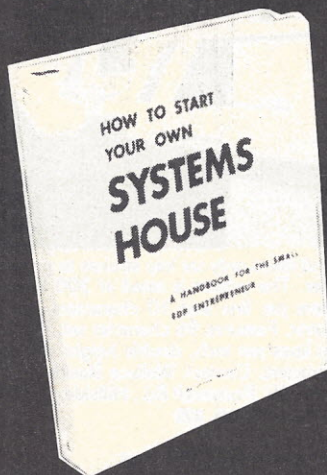
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CIRCLE INQUIRY NO. 377

Cross Reference Tool

PRGM/MAP for Microsoft BASIC programs produces alphabetical lists of variables, commands, functions, constants, quoted strings and line numbers. Each "word" is listed with the line number(s) in which it is found. Print width and paging control is included. Minimum equipment required includes 8080 or Z-80 mainframe with 48K of memory, floppy disk, CRT and printer. Operating system required is CP/M with Microsoft MBASIC or MITS/Pertec disk extended BASIC. Contact: The Software Store, Ltd., 706 Chippewa Sq., Marquette, MI 49855.

CIRCLE INQUIRY NO. 375

Database Management System

T.I.M. (Total Information Management) is a database management system intended for billing, inventory, mailing lists, customer/client record keeping, real estate listings, or any other operation requiring a flexible database. Data file resorting is eliminated by using an automatic record merge. T.I.M.'s "Build" command allows the user to selectively retrieve all records which satisfy given multiple search criteria. Reports may be generated which calculate field subtotals, minima, maxima, as well as the mean, variance, and standard deviation for up to three fields and two breaks. A "Form Letter" command combines text editing capabilities with the ability to incorporate information from T.I.M. data files. The system is available under Micropolis MDOS as well as CP/M-MBASIC. Contact: Innovative Software, 9805 Holly, Kansas City, MO 64114.

CIRCLE INQUIRY NO. 374

TRS-80 Word Processor

WordMagic II for the TRS-80 Model II features file compatibility; full cursor control (up, down, left, right, end of line, find, hack, etc.); full edit capability (insert—text moved to right, down, delete, substitute, overwrite, etc.); paging; printing; automatic page number insertion; documents up to diskette capacity; variable margins and tab stops; and more. Text may be entered without hitting the ENTER key and words that overflow the right margin are automatically moved to the next line. Smooth, ragged right, centering, mailing lists, automatic generation of a table of contents. Contact: CalData Systems, P.O. Box 178446, San Diego, CA 92117.

CIRCLE INQUIRY NO. 274

Text Editor for TRS-80

The editor requires a 64K-byte system with one disk drive and was designed to utilize the Model II as a word processor. A 23-line by 70-column section of the document being edited is always visible on the display screen. The document is viewed as either white on black or black on white. Highlights include upper and lower case, the ability to move, copy or delete a line or paragraph, inserting or replacing lines, finding or changing a word or phrase, and merging multiple lines or paragraphs. Contact: Computer Bugs, P.O. Box 789, Boynton Beach, FL 33035.

CIRCLE INQUIRY NO. 275

Investment Management

Investment Portfolio System is a database management type of program to be used by personal investors in the management of stocks, bonds, treasury bills, real estate, and other investments. The program will store and report data on as many as 72 securities, review items in the portfolio by price, yield, percent gain or loss. It provides four special reports: complete summary data on the portfolio, current value and return, long and short term gain, and a security analysis report. This latter report provides information about return on investment, annualized yield, earnings and yield gain compared to market index—information the average individual investor has not been able to develop before. The program is available in a disk version for TRS-80 32K II single drive computers, and in a tape version for 16K LII tape systems. Both programs are supplied on a single tape, so that a hardware conversion from one system does not require updating of software at additional expense. Conversion requires only that the program be loaded and saved to disk. Documentation is a printed 38-page booklet with instructions, technical documentation, formulation and program listing. Contact: Personal Finance Systems, 1446 Durham Rd., Madison, CT 06443.

CIRCLE INQUIRY NO. 276

CBASIC-2 Business System

Computer Services of Encinitas offers a line of Osborne business applications programs in CBASIC-2 for the North Star MicroDisk System. Included are general ledger, accounts payable, accounts receivable, and payroll. Programs are custom configured to match disk and terminal configurations. Each system includes complete symbolics, customized intermediate files and complete documentation on three levels—management, user and programmer. It's available in single, double and quad density formats. Contact: Computer Services of Encinitas, 341 Willow-spring Dr., Encinitas, CA 92024.

CIRCLE INQUIRY NO. 277

Apple Word Processing

Write-on! enables the user to find, change, insert, delete, merge and repeat text under typewriter-like conditions without computer training. The package can be used with any Apple II computer with a disk and Applesoft (32K ROM or 48K RAM). A keyboard input enables users to insert names, addresses or other information into standard letters or forms while printing. This software prints personalized form letters, mail labels, bills, or checks; create and maintain data files and merge into text files; create data files from existing mailing lists and accounting system files; and, preformat text for faster printing on high speed and unbuffered printers. Contact: Rainbow Computing, Inc., Garden Plaza Shopping Ctr., 9719 Reseda Blvd., Northridge, CA 91324.

CIRCLE INQUIRY NO. 279

Sort-Merge System

Vsort is a high-speed sort-merge system which can be used as stand-alone utility or as an assembly language subroutine to CBASIC. When used as a subroutine to a CBASIC program, Vsort rolls out the entire run-time package and the calling program to disk to maximize the buffer space available. This increases the speed of the sort for large files. The package will sort fixed or variable length fields. Required are a CP/M compatible operating system and a minimum of 32K RAM when used in the CBASIC subroutine mode. It is also available for use with the specially modified versions of CP/M for the TRS-80 Model I, the Heath H-8 and the Zenith Z-89 computers. Contact: Lifeboat Assoc., 2248 Broadway, New York, NY 10024.

CIRCLE INQUIRY NO. 280

Extensions to Pascal

Advanced Systems Pascal is written in assembler code and includes a system library and a full-linkage editor subsystem. ASP extensions to Pascal include business arithmetic, character string manipulation, disk random access, and ISAM. A program under development can be broken down into separate modules that can each be worked on individually and linked together when completed. Contact: InfoSoft Systems, Inc., 25 Sylvan Rd. S., Westport, CT 06880.

CIRCLE INQUIRY NO. 281

Office Management System

COSMOS (Computer System for the Management of Office Services) interfaces and standardizes a variety of communicating word processors. They may be local or remotely connected to either single or multiple systems, and multiple sites can be connected for document transfer and electronic mail functions. The system uses the IBM Series/1 minicomputer with on-line, mass storage, high-speed draft printing and archival storage capabilities and offers the following features: word processing support, multi-station communications, document storage, version definition and revision control, document security, high-speed draft printing, electronic mail, follow-up file, data processing capability and supervisory control. Contact: DPD Systems Inc., 132 W. 31 St., New York, NY 10001.

CIRCLE INQUIRY NO. 282

3-D Plotting

Hidden Line is a software package for the plotting of three-dimensional functions on any standard CRT. Full control is provided for viewing perspective, positioning of data on the base "Net," Z value amplification, continuous rotation, selectable resolution, and output device width assignment. Contact: Cognitive Electronics Laboratory, P.O. Box 615, New Braunfels, TX 78130.

CIRCLE INQUIRY NO. 286

Multi-User Cobol System

RMI COS990 for Texas Instruments' DS990 model 1 and model 2 business computers is designed for development, compilation and execution of Cobol business applications. Over 30K bytes are available for user programs. The language is source compatible with DX10 Cobol. In the operating system, directories, pathnames and file types are logically equivalent with TI's DX10 operating system. A job description language provides for parameter passing, conditional execution, batchstreams and access control of over 64,000 levels. Contact: Ryan-McFarland Inc., 2111 N. Mays, Round Rock, TX 78664.

CIRCLE INQUIRY NO. 283

File Transfer for PDP-11

RDA has released Version 2 of File Transfer Program that provides the communication facility required to transfer source, data or binary files between Digital Equipment's PDP-11 or LSI-11 processors. It features low cost asynchronous serial interfaces and modems and is uncomplicated and simple to install and operate. The system incorporates a line protocol which provides complete error checking and automatic retransmission. Extras include: expanded command set, support for multiple telecommunication lines and extended error message functions, and an explanatory 14-page manual. Contact: RDA, Inc., 5012 Herzel Pl., Beltsville, MD 20705.

CIRCLE INQUIRY NO. 284

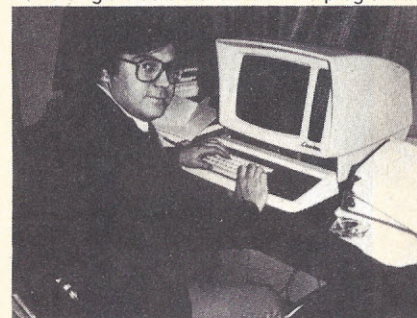
Game Package

Fun on the Horizon is a collection of 40 games for the North Star Horizon. With average program length over 200 lines, games include poker, golf, football, biorhythm and blackjack. All programs use the 64 character ASCII subset with max line length of 64 characters. Single or double density on 1 or 2 specially modified double-sided diskettes. Contact S & S Computing, Inc., R.D. #2 Box 103, Moscow, PA 18444.

CIRCLE INQUIRY NO. 289

Audit and Retrieval Software

EDP-Auditor 5.5 is a library of generalized audit and retrieval routines, featuring a series of System Management Facilities (SMF) routines. There are 110 modules that introduce 10 common SMF routines that define all record types in the SMF file, and allow use of any record type with a single macro-instruction. The program in-



corporates an English-like free-form language, up to 32 character names, compound arithmetic operations, global selection logic, statistical sampling, distribution analysis, graph and confirmation capabilities. Run on any IBM operating system in the 360/370, 303X, 4300 series. Contact: Cullinane Corp., 20 William St., Wellesley, MA 02181.

CIRCLE INQUIRY NO. 285

Business Package for BASIC

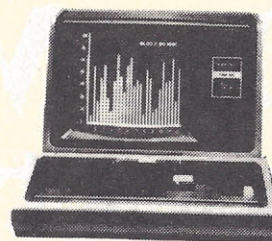
Volume X "A Total Business Package" is set up to handle businesses using the accrual system and standard double entry ledgers. It can also be used by cash system businesses. Included are A/R, payroll accounting, billing, inventory control and sections for fixed asset accounting, maintenance of mailing lists, taxes and an A/P section. Contact: Kemco Ltd., Box 270278, Tampa, FL 33688.

CIRCLE INQUIRY NO. 291



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Sink the Bismarck with Your Apple

Computer Bismarck is an historical simulation game of the British attempt to find and sink the German battleship Bismarck in 1941. The game is played on an Apple II computer with an Apple-soft firmware ROM card or an Apple II Plus and requires 48K memory and a minifloppy disk drive. The game features a high resolution color



graphics mapboard of the North Atlantic and players take turns moving their fleets of ships and aircraft. Combat occurs when opposing units spot each other. The game includes a program disk, rule book and seven player aid charts. Contact: Strategic Simulations Inc., 501 Kingsley Ave., Palo Alto, CA 94301.

CIRCLE INQUIRY NO. 287

Framing Calculator

The menu-driven, user-oriented program is designed to assist general contractors, architects, construction estimators and engineers in quickly calculating estimated labor and material requirements for general wood frame construction. Lists are generated for joist systems, roof systems and walls. Written in Microsoft BASIC, versions are available for CP/M systems with 48K and TRS-80 32K disk. Contact: Mendocino Software Development, P.O. Box 1564, Willits, CA 95490.

CIRCLE INQUIRY NO. 288

Software Building Blocks

Intel's 8080/8085 Fundamental Support Package, a class of microprocessor applications development software, contains nine libraries of standardized software building blocks for arithmetic processing, statistics, process control, scientific and similar applications. Modules selected from the libraries link to one another to form complex functions. They also link to user programs written in assembly language, PL/M and FORTRAN. Contact: Intel Corp., 3065 Bowers Ave., Santa Clara, CA 95051.

CIRCLE INQUIRY NO. 290

Land Development Accounting

The Land Development Accounting System (LANDAC) for IBM and Burroughs computers is available on DEC 1170 computers from Information Management International. It consists of five modular subsystems (comprising 230 programs) covering receivables, commissions, inventory, sales and lead processing, and escrow sales. Includes: consolidated reporting of multiple lenders and projects; discount/premium reports for accrual accounting; up to five scheduled payment charges per account and social-economic customer profiles. Contact: Information Management International, 3333 Bowers Ave., Santa Clara, CA 95051.

CIRCLE INQUIRY NO. 292

Settlement Statement Closing

The Closer program for vertical banking, real estate and legal markets allows banks, mortgage lenders and law firms to prepare settlement statements with reduced costs and more flexibility. The program makes last minute changes and produces the final settlement statement on either a worksheet facsimile or on proper government documents. It is written in CBASIC and runs on any CP/M based system. Contact: Information Engineering, Box 198, 8 Bay Rd., Newmarket, NH 03857.

CIRCLE INQUIRY NO. 293

CP/M Plotter

Plotter turns any microcomputer that operates under the CP/M operating system and uses CBASIC-2 into a graphics output station. Output consists of an X and Y axis plot of coordinate pairs. Plotter reads an output coordinate file either produced by the user's CBASIC-2 application program or by entering X,Y data points into supplied data entry program. Coordinate data is entered, then output to a diskette data file. Plotter reads in this data, scales it for optimum fit and plots it on a coordinate grid with labeled axes and graph title. May be used for graphically displaying data for business, sales presentations, teaching aids, or display sales versus time and show trends at a glance. Contact: HSC Computer Services, Ltd., P.O. Box 43, Brooklyn, NY 11236.

CIRCLE INQUIRY NO. 294

Client Billing System

The system meets the billing requirements of service related professions to reduce the time required to produce client statements, thereby allowing more time for other required activities. It runs on the Hewlett Packard HP-85 and performs main system menu and current date entry routines, bill entry and editing, bill printing, payment entry, client data list, aging analysis of open bills, backup of client data. Contact: The Profit Group, 5 S. La Grange Rd., La Grange, IL 60525.

CIRCLE INQUIRY NO. 295

Apple Communication System

A program especially designed for the Apple Plus and Apple II (equipped with disk drive, ROM Applesoft and D.C. Hayes micromodem) will transfer programs in all three languages from one Apple to another over the telephone. The transferred program is stored on the receiving Apple's disk, ready to use. The system comes on diskette with documentation. Contact: NEO/ABBS, Box 4731, Cleveland, OH 44126.

CIRCLE INQUIRY NO. 297

Our MacroFloppy™ goes twice the distance. For \$695.



Introducing the Micropolis MacroFloppy™:1041 and :1042 disk drive subsystems. For the S-100/8080/Z-80 bus. Packing 100% more capacity into a 5¼-inch floppy disk than anyone else. 143K bytes, to be exact. For as little as \$695.

The MacroFloppy:1041 comes with the Micropolis Mod I floppy packaged inside a protective enclosure (without power supply). And includes an S-100 controller. Interconnect cable. Micropolis BASIC User's Manual. A diskette containing Micropolis BASIC, and a compatible DOS with assembler and editor. The :1041 is even designed to be used either on your desk top, or to be integrated right into your S-100 chassis.

The MacroFloppy:1042 comes with everything the :1041 has, and more. Such as d.c. regulators, its own line voltage power supply, and, to top it off, a striking cover. Making it look right at home just about anywhere.

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For a descriptive brochure, in the U.S. call or write Micropolis Corporation, 7959 Deering Avenue, Canoga Park, California 91304. Phone (213) 703-1121.

Or better yet, see your local dealer.

MICROPOLIS™

More bytes in store for you.

RPG-II Word Processing

Release 2 of a system for the IBM System 32 and System 3 is available with the following features. Nine-digit zip code, formerly reserved disk space, can be added at the user's command. The system contains a list of the most frequently misspelled words, plus any number of user additions. When a word on the list is encountered, the operator will be shown the possibly misspelled word and the alternate spelling. Page numbers, headings and footings can be added. Contact: Oak Software, 14377 Valentine Dr., Largo, FL 33540. **CIRCLE INQUIRY NO. 296**

On-Screen List Maker

The Listmaker for the TRS-80 allows up to 400 names or items with codes to be entered within a 16K memory limitation. Five-digit codes (numbers, letters or mixed) allow detailed identification of groups of names. The program will list names in a specific 5-digit code, by first digit only, or first two, three or four digits. The program sorts names alphabetically, finds and displays any name for review, editing, code change or deletion and memory recovery. Saves to tape and loads lists from tape. Contact: Manhattan Software, Inc., P.O. Box 5200 Grand Central Station, New York, NY 10017.

CIRCLE INQUIRY NO. 298

Datapoint Display Program

DPT-CAT, a Datashare program which can be used on any Datapoint system running under Datashare 5.2 and DOS.A/E or DOS.D, allows a variety of methods for searching and displaying file names. It has the ability to display only those files whose names match specified characters in specified positions. For example, if all files concerning New York are to be identified with "NY" in columns 7 and 8 of the file name, the program can be instructed to display only those file names with NY in columns 7 and 8. Contact: DPTPLUS, Inc., Box 917, Wichita, KS 67201. **CIRCLE INQUIRY NO. 299**

Fastmail

A mailing list maintenance system for the small business incorporates efficient flexibility in handling both list updating and generation of labels through various sort options. The system, quickly learned by the computer novice, includes adding, changing, deletion, printing of all labels, printing of coded labels, printing by any field sort, as well as additional address lines and extra length address lines for institutions. Utilities are furnished which allow purging disk space not being used. The system is written in North Star BASIC and has merging capability with word processing systems, particularly Magic Wand. Contact: Media 2001, P.O. Box 614, Corte Madera, CA 94925. **CIRCLE INQUIRY NO. 300**

Typesetting Aid

Mediamix offers PSRJ+ 2.0 for use with its IBM Model 50 typewriter/TRS-80 interface. This machine language program prints an Electric Pencil text file (or any ASCII file) using proportional spacing type elements with right justification. The user



can embed codes in text for centering titles, indenting paragraphs, underlining, typing special characters and pauses during printing to change type fonts for titles and italics. Contact: Mediamix, P.O. Box 8775, Universal City, CA 91608. **CIRCLE INQUIRY NO. 302**

Disk Debugging for TRS-80

Suprdump is an interactive disk dump/modify utility for the TRS-80 Model I designed to expedite debugging of programs utilizing disk files and to create disk file test data. The utility will dump a specified disk sector onto the video screen in a hex plus ASCII format. Modification is accomplished by typing over the displayed hex or ASCII data. Contact: Definitive Micro Systems, 20 Glenwood Cres., St. Albert, Alberta, Canada T8N 1X5.

CIRCLE INQUIRY NO. 301

Pascal for 6800/6809

Version 2 of Lucidata's P-6800 Pascal system is designed to run on the Motorola 6800/6809 microprocessors running the Flex disk operating system from Technical Systems Consultants. Features include the data type REAL (i.e., 9-digit precision floating point values), CASEd RECORDS, own TYPE and sub-range of INTEGER definitions as well as the functions CARD, MOD, ABS, SQR, ROUND and TRUNC. Support of the Flex random file facility through the non-standard procedure POSITION (filename, logical record) is also provided. Supplied on a 5" minifloppy diskette with user manual and installation instructions. contact: Lucidata, Oostende 223, 2271 EG Voorburg, The Netherlands. **CIRCLE INQUIRY NO. 303**

HP 3000/Mainframe Link

IML/3000 links user-written programs in high-level languages with HP terminals using a 3270 binary synchronous protocol with IBM mainframe computers, or those using IBM software. HP 3000 programs in COBOL, FORTRAN, BASIC or Systems Programming Language (SPL), can pass data to, or read data from application programs on the mainframe using CICS or IMS DB/DC. Contact: Hewlett-Packard Co., 1507 Page Mill Rd., Palo Alto, CA 94304. **CIRCLE INQUIRY NO. 304**

MetaFloppy™ goes beyond.

The Micropolis MetaFloppy™ gives you more than four times the capacity of anyone else's 5¼-inch floppy. Because it uses 77 tracks instead of the usual 35.

The field-proven MetaFloppy, with thousands of units delivered, comes in a complete family of models. And, like our MacroFloppy™ family of disk drives, MetaFloppy is designed for the S-100/8080/Z-80 bus.

For maximum capacity, choose our new MetaFloppy:1054 system. Which actually provides you with more than a million bytes of reliable on-line storage. For less money than you'd believe possible.

The MetaFloppy:1054 comes complete with four drives in dual configuration. A controller. Power supply. Chassis. Enclosure. All cabling. A new BASIC software package. And a DOS with assembler and editor. There's even a built-in Autoload ROM to eliminate tiresome button pushing.

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Increased Power/Storage of PCC 2000

The MT2 is a multi-terminal, multi-tasking operating system for the Pertec 2000 desktop computer system. Hard disk options for the system can add up to 80 megabytes of fixed and removable storage. The MT2 includes a disk-based re-entrant BASIC compiler, link editor and utilities. It can also be ordered with an optional macroassembler (MT2-ASMZ) for program development. MT2-Wordflow is an optional word-processing subsystem available for use with MT2 in a multiple-user environment. Hard disk expansion options provide the storage capacity needed to make full use of the PCC 2000's multi-tasking, multi-terminal software. Contact: Pertec Computer Corp., 12910 Culver Blvd., Los Angeles, CA 90066.

CIRCLE INQUIRY NO. 306

Application Software

North Star Computers has four application software packages designed for use on the Horizon microcomputer. Included are a word processing, mail list manager, information list management system, and a combined general ledger/financial accounting program. The packages are fully integrated and written with the first-time user in mind.

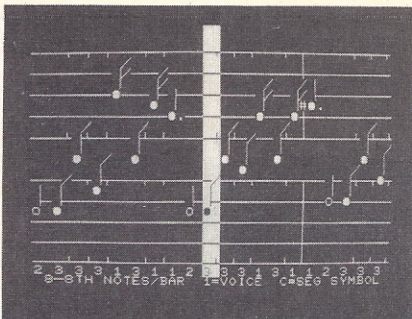


Each package can be used alone, or in combination with another package to create a more powerful and flexible software system. Its central building block is NorthWord, the word processor, that features easy entry and editing, on-screen text formatting, simultaneous document printing and more. Contact: North Star Computers, Inc., 1440 Fourth St., Berkeley, CA 94710.

CIRCLE INQUIRY NO. 307

Four-Part Music System for PET

The Visible Music Monitor is intended to support four-part harmony systems such as the KL-4M DAC board, enabling PET users to create and play four-part musical combinations. The program is written entirely in 6502 machine language so that it is able to display the musical staff and notes for all four voices on the PET screen.



Other features include a mode to load successive songs without intervention, user definable keyboard, complete tempo flexibility, transpose capability, and waveform modification capability. With the KL-4M board only a speaker is required. Connection is made via the PET parallel and cassette ports. Contact: A B Computers, 115 E. Stump Rd., Montgomeryville, PA 18936.

CIRCLE INQUIRY NO. 308

Modem Program for 6800/6809

AAA Chicago Computer Center has available a Modem Program Version 2.0 which permits the user to interface a modem through a serial interface installed in any I/O port. Disk file transmission in both directions is supported as well as keyboard transmission. The routine that polls disk, keyboard and modem is under complete user control. Disk system does not have to be DMA. Contact: AAA Chicago Computer Center, 120 Chestnut Ln., Wheeling, IL 60090.

CIRCLE INQUIRY NO. 309

Operating System Expands Alpha 7

The Pegasus Operating System from Alpha Professional Systems incorporates four packages to expand the capability of their Alpha System 7 word/data processing system for lawyers, physicians, dentists, accountants, architects and advertising agencies. The system features data communications, word processing file merge, simultaneous printout of multiple-queued documents and financial computations. The communications package allows the transfer of both word processing and data processing files and correspondence at 300-2400 baud. Simultaneous printout permits any number of documents to be queued to the printer. For word processing functions, the file merge package allows a name and address file, or any other word processing file, to merge with other WP files. The financial program incorporates 23 separate functions including loan amortization, sinking funds, commercial paper, yields, depreciation and future values. Contact: Alpha Professional Systems, 9465 Wilshire Blvd., Ste. 518, Los Angeles, CA.

CIRCLE INQUIRY NO. 310

Travel Reservation System

A computerized system capable of handling up to 2,000 passengers per month is available to the travel industry from Integral Business Computing, Inc. Prospective markets include smaller tour operator wholesalers and retail travel agencies that operate their own programs. The system is designed to handle on-line reservations for tour packages and offers complete control over inventory, invoicing, passenger documentation, ticketing, accounting and management reporting. Other features include extensive data entry editing and human engineered design to enhance clerical accuracy and reduce associated paperwork. Contact: Integral Business Computing, Inc., 1440 W. Pacific Coast Hwy., Harbor City, CA 90710.

CIRCLE INQUIRY NO. 311

Improved Keyed File Support System

Micro Applications Group has available the MAGSAM IV, a high-performance version of its keyed file management system that combines the features and capabilities of MAGSAM III with the speed and performance of 8080 assembler. Access times are reduced up to 75% compared to previous versions. System developers can create programs that access data records quickly and directly by user defined keys. Secondary indexing with any number of keys is provided to allow access to data by any and all desired data elements. Real-time record and key deletion with automatic reclamation of free space conserves disk space while simplifying program development. Available on standard 8" and Micropolis Mod II diskette formats. Contact: Micro Applications Group, 7300 Caldas Ave., Van Nuys, CA 91406.

CIRCLE INQUIRY NO. 312

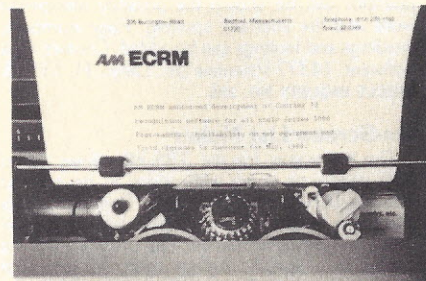
Word Processor for TRS-80 II

Word-M2 helps prepare letters, memos, reports, manuals, documents and even books with text format commands that set page length, line width, skips pages and text, indents, centers text. Line spacing, filling, adjusting, right justification and page numbering are automatically controlled. Word-IV for TRS-80 I features upper/lower case without hardware modifications. Contact: Micro Architect Inc., 96 Dothan St., Arlington, MA 02174.

CIRCLE INQUIRY NO. 313

OCR Recognition for Courier 72

AM ECRM's software package, developed for the 5000 Pagereader series, enables its optical character recognition (OCR) equipment to electronically read the Courier 72 font. The program will enable users to convert standard business correspondence into final form and permits 5000



series Pagereaders to accept straight and underscored text prepared with a Courier 72 typewriter element. The system also reads OCR A, OCR B, Courier 12, ECRM Legal and Prestige Elite. Software is adaptable to all existing AM 5000 systems. Contact AM International, 1900 Ave. of the Stars, Los Angeles, CA 90067.

CIRCLE INQUIRY NO. 314

Cross Assembler

Microsoft's XMACRO-86 cross assembler assembled 8086 code on any 8080 or Z80 development system. It is compatible with three operating systems—CP/M, ISIS-II and TEK-DOS. It has an assembly rate of over 1000 lines per minute. The system features relocation, macros, conditional assembly, listing and loader control, and supports a complete Intel 8080 standard macro facility. An expanded set of pseudo operations includes testing of assembly pass, symbol definition and parameters to macros. Contact: Microsoft, 10800 NE 8th, Ste. 819, Bellevue, WA 98004.

CIRCLE INQUIRY NO. 315

Construction Accounting

Micro Software Products offers a software package for construction firms that includes job costing, sales analysis, project analysis, cash transactions, payroll processing, timekeeping, a unit profit and loss summary, and forecasting. The programs are designed for use by non-computer personnel by using a menu prompting process. The system is professionally documented with a reference manual that assists in a quick startup and short training. Features include on-line summaries of transactions, user selected report sorting, analysis and cash flow reporting, quarterly and yearly payroll information, weekly labor distribution and more, available on North Star. Contact: Micro Software Products, 6902 E. Culver, Scottsdale, AZ 85257.

CIRCLE INQUIRY NO. 316

Cross Assemblers for CP/M

Midwest Micro-Tek, Inc. has four off-the-shelf cross assemblers for the CP/M operating system. These are the Intel 8048, Motorola 6803, Syner-tek 6502, and RCA 1802. Each assembler supports the manufacturers mnemonics and includes user selectable options such as label table, cross reference table, and several page format options. Contact: Midwest Micro-Tek, Inc., P.O. Box 29411, Brooklyn Center, MN 55429.

CIRCLE INQUIRY NO. 317

Development System for Mod II

Racet Computes offers a development system package for the TRS-80 Model II that contains the following assembly language programming tools: an all new machine language SUPERZAP, the Apparat editor/assembler and disassembler modified for use on the Model II. Contact: Racet Computes, 702 Palmdale, CA 92665.

CIRCLE INQUIRY NO. 318

Accounting Package for Beginners

A set of interactive financial applications programs designed for first-time users of business processing systems is available from Rexon Business Machines Corp. The Software Fitness Program was written specifically for operation on the RX30 business processing system by Open Systems, Inc. and contains modules for performing general ledger, inventory control, accounts payable, accounts receivable, payroll, purchase order handling, and job costing. The modules can be implemented separately so that new users can convert their business procedures to the Software Fitness Program at their own pace. The system is written so that independent modules automatically share common data with each other, such as customer address records, account numbers, etc. A complete set of user documentation is included, and each guide teaches both the very basics of the accounting operation as well as the terms and symbols required for system operation. Contact: Rexon Business Machines Corp., 5800 Uplander Way, Culver City, CA 90230.

CIRCLE INQUIRY NO. 319

Relocatable System Monitor

RSMII machine language monitor has all of the features developed for the TRS-80 Model I (except tape commands), including commands to insert breakpoints, dump memory in hex and ASCII, test, search, modify, verify, zero and fill memory, etc. The symbolic dump command (Z-80 disassembler) is also featured, along with a video editor for examining and modifying both memory and disk sectors. Disk commands can access any of four drives and read/write single and double density disks. There are controls that provide split-screen scrolling, where only half the screen scrolls, allowing up to 48 lines to be displayed with some commands. Page length control is featured, and RS-232C handshaking is supported. Contact: Small System Software, P.O. Box 366, Newbury Park, CA 91320.

CIRCLE INQUIRY NO. 320

System Level Acceptance Test

Computer Automation, Inc. has a standalone test program that gives an operator a quick look at the operational status of all elements of any configured system. The System Level Acceptance Test establishes operator confidence in a Naken Mini 4 mixed-vendor system at run time. Users may redefine a system configuration within the program by responding to menus and questions; it prompts the program displays on a terminal. After the user identifies all I/O devices, options may be selected quickly. Several pre-defined systems may be stored. The program recognizes errors originating in the processor or peripheral devices connected to it. A verification document is generated that describes performance and tests run on each component, and lists errors. Contact: Computer Automation, Inc., 2181 Dupon Dr., Irvine, CA 92713.

CIRCLE INQUIRY NO. 321

Array Handling Package

Matrix transforms PET/CBM personal computers into research and teaching instruments. The 5K assembler language program expands Commodore BASIC with 14 new statements. Variations lead to more than 25 distinct operations. A single Matrix statement displays a matrix on the screen; the values on the screen can be changed and entered into memory. Other statements transfer data and diagonals between matrices, transpose matrices, give vector and matrix addition, subtraction, multiplication, elementwise multiplication, division, squares and square roots. All statements can be used in BASIC programs and can be entered interactively as direct commands from the keyboard. Algebraic style statements involve array names and operator symbols. Indexing, orienting of vectors, and conversions between integer and floating point are automatic. Tape or disk for 8K, 16K and 32K machines. Contact: Cognitive Products, P.O. Box 2592, Chapel Hill, NC 27514.

CIRCLE INQUIRY NO. 322

Artificial Intelligence Simulation

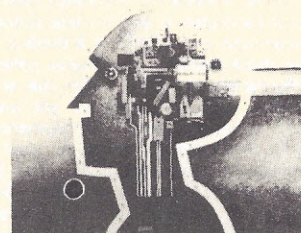
Eliza, an exercise in the simulation of artificial intelligence is available from Radio Shack for use on their TRS-80. The procedure allows a computer to analyze conversational English, respond to questions, and carry on a "conversation" with the person at the keyboard. Note: the program is a "simulation" of artificial intelligence. It is not capable of independent thought and its comments, especially evaluations, are not to be taken seriously. Contact Radio Shack, 1300 One Tandy Center, Ft. Worth, TX 76102.

CIRCLE INQUIRY NO. 323

Screen Editor

Compucolor II Screen Editor is designed for editing and creating source files. It requires 16K minimum memory and the 117 keyboard. Program allows for single key commands such as TOP OF THE PAGE, END OF THE PAGE, SEARCH, READ, WRITE, DELETE CHARAC-

SCREEN EDITOR



TER and DELETE LINE. A file can be cycled which saves the file currently in the buffer and allows for continuous editing by rewinding the file. Eight cursor commands allow easy editing with a four-color intelligent cursor. Contact: Compucolor Corp., 225 Technology Park/Atlanta, Norcross, GA 30092.

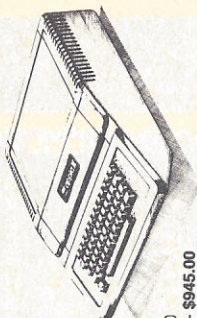
CIRCLE INQUIRY NO. 324

Futra Company

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Torrance, CA 90510

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Apple II or Apple II Plus
w/16K RAM



List - \$1195.00
FUTRA Price - \$945.00
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400 (w) 8K \$475.00
800 (w) 8K 795.00
North Star Computers
Horizon II 32K D/Den (Assembled) 2361.00
with all options
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with all options

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5510 R/O, RS232 (w) Tractor, 2695.00
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Texas Instrument
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Integral Data Systems
IDS-440G "Paper Tiger". 925.00
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Annadex
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version, RS232 & Parallel input

DP-8000-AP, "Apple/Sider"
96 column version. Parallel only 835.00

Trendcom
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"Silentype" (96 column thermal) 555.00
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895.00

ADDs
Regent 25 CRT Terminal 143.00
Leasex

Video 100, 12" B/W Monitor
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4508, 9" B/W Monitor

Base 2
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2K buffer, FULLY LOADED

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Soroc
IQ-120 CRT Terminal 985.00
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Texas Instrument
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5 1/4" Diskettes \$27.00
0, 10 or 16 sector. Box of 10

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3 ring Vinyl Diskette Sleeves
Each holds (2) 5 1/4" diskettes. 6.95
Package of 10

APPLE ACCESSORIES:

(shipping included)
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Graphics Tablet 679.00

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Parallel/Printer Int. card 397.00

H. S. Serial Int. card 149.00
Centronics Printer Int. card 159.00

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*** ABT Apple numeric key Pad** 115.00
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*** D. C. Hayes Modem II** 345.00
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For Apple II 4499.00
* = Independent Manufacturer

OTHER ACCESSORIES

Sup 'R' Mod R. F. Modulator \$29.00
Visi Calc (software disk) 120.00

Apple Bowl (software disk) 14.00
Computer Bismarck (software disk) 49.00

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TERMS OF SALE: Master Charge or Visa add 3% service charge to purchase price. No COD's. Allow 3 weeks for personal checks to clear. Orders under \$50.00 add \$2.00 for shipping and handling costs. All other orders (unless specified in ad) that are within 50 lbs. limit of U.P.S. will be shipped, no charge. Shipments over 50 lbs. in weight or out of Continental U.S. shipped freight collect. All prices subject to change and all offers subject to withdrawal without notice. California residents add 6% or 6.5% if serviced by BART.

Dental Management System

CalData's DentalWare is a self-contained series of programs for dental practice. Features include: patient personal, financial and insurance record keeping, treatment plans and work history, details of patient treatment, individual and family accounts, recall and delinquent notices and fully itemized statements. Also includes a self-customized program allowing statements, notices and charges to be defined by the individual user. The system uses password access to various commands, and has word processing capability. Package includes 10 diskettes, three user's manuals and three self-instruction packets. Available for use on the TRS-80 Model II. Contact: CalData Systems, P.O. Box 178446, San Diego, CA 92117.

CIRCLE INQUIRY NO. 325

Application Software for Doctors

A medical office business system (MOBS) is available for the 6800/6809 computer system. The system will maintain patient account records, prepare billing statements, insurance forms and routine correspondence and present reports for the management and control of a medical office or one or more doctors. It maintains patient account information on disks. After the account number and data for a patient are entered, appointments, office services and payments may be posted to that account number. Account status can be recalled and reviewed at any time. Billing statements may be prepared for either specified accounts or all accounts with an outstanding balance. The system includes a text editor and text processor which can be used as a word processor independently of the business application software. It is designed to run in 40K with a minimum of a dual 5" disk system. SSB, DOS and Computerware Random BASIC are required. Contact: Computerware, 1512 Encinitas Blvd., Box 668, Encinitas, CA 92024.

CIRCLE INQUIRY NO. 326

North Star BASIC Utility Set

SZ Software Systems offers the N*BUS, a BASIC utility set that aids programmers who use North Star BASIC. The set features a co-resident source program editor with advanced editing facilities that significantly reduce programming time and error. Editor encompasses 26 separate commands including global locate and change, line insert and append, copy, move, erase columns, delete, print and line scrolling. The software is delivered with a BASIC program that personalizes the machine code of editor to any release 4 (or later) version of North Star BASIC, regardless of origin, arithmetic precision, hardware/software floating point or DOS density. Includes BPAK, a program pack utility, BPRT, a program formatted list and cross-reference utility, RE, a file rename utility and an extensive 64-page user's guide. Contact SZ Software Systems, 1269 Rubio Vista Rd., Altadena, CA 91001.

CIRCLE INQUIRY NO. 327

Graph Data on Apple II

A data-graphing program for Apple II is available which plots line graphs, dot graphs, and scatter plots. Up to three 40-point curves may be plotted on the same coordinates with X and Y axes dimensioned. Curves may be saved to disk and recalled instantly. If a screen printer is used, hard copy of graphs may be obtained. Apple Data-Graph is useful for graphing stocks, business reports and technical data. Runs on a 32KB Apple with Applesoft ROM and one disk. Contact: Connecticut Information Systems Co., 218 Huntington Rd., Bridgeport, CT 06608.

CIRCLE INQUIRY NO. 328

6809 Diagnostics and Disk Repair

Technical Systems Consultants, Inc. offers a memory diagnostic and disk repair package for the MC6809 advanced microprocessor. The utility programs are designed to run under the 6809 Flex operating system. Included are zeroes and ones test, random pattern test, walking bit

tests, dynamic RAM dropout test, and a convergence test. All memory tests are position independent. The disk repair portion of the package contains utilities which operate on a Flex-formatted diskette. Three diagnostic utilities report unreadable sectors and structural inconsistencies among the files on the diskette. Two utilities recover data when the directory on the diskette is not readable. Contact: Technical Systems Consultants, Inc., P.O. Box 2570, W. Lafayette, IN 47906.

CIRCLE INQUIRY NO. 329

Sorting Data in Memory

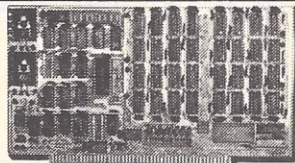
Sortmaster contains listings of five BASIC subroutines designed to sort numeric data in memory. Each of these subroutines has been designed to be integrated into a main line program. Any numeric field in the user's record may be sorted by designating that field as the sorting key, allowing records of any length to be sorted, and permitting multiple sorting keys as well. By adjusting certain variables, each routine can handle alphanumeric data as well. Designed for use with TRS-80, PET and Apple. Contact: Creative Computer Consultants, P.O. Box 2111, Norwalk, CT 06852.

CIRCLE INQUIRY NO. 330

Adventure Game for KIM-1

Kim-Venture runs in 1K and contains a Kim cassette, a 32-page operator's manual and three pages of player instructions. Similar to Dungeons and Dragons, Adventure and Quest, Kim-Venture player instructions give just enough information to allow a player to command the KIM; the operator's manual contains all the details. Program listings, operational notes, KIM memory map, a map of the caves, scoring procedures and more are included. This game contains magic, monsters and mysteries, and only the operator knows what's really happening, where and to whom. Contact: Aresco, Inc., P.O. Box 1142, Columbia, MS 21044.

CIRCLE INQUIRY NO. 332



64K BYTE EXPANDABLE RAM

DYNAMIC RAM WITH ON BOARD TRANSPARENT REFRESH GUARANTEED TO OPERATE IN NORTHSTAR, CROMEMCO, VECTOR GRAPHICS, SOL, AND OTHER 8080 OR Z-80 BASED S100 SYSTEMS * 4MHZ Z-80 WITH NO WAIT STATES. * SELECTABLE AND DESELECTABLE IN 4K INCREMENTS ON 4K ADDRESS BOUNDARIES. * LOW POWER—8 WATTS MAXIMUM. * 200NSEC 4116 RAMS. * FULL DOCUMENTATION. * ASSEMBLED AND TESTED BOARDS ARE GUARANTEED FOR ONE YEAR AND PURCHASE PRICE IS FULLY REFUNDABLE IF BOARD IS RETURNED UNDAMAGED WITHIN 14 DAYS.

ASSEMBLED / TESTED

64K RAM	\$595.00
48K RAM	\$529.00
32K RAM	\$459.00
16K RAM	\$389.00
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THE MK4116-3 IS A 16,384 BIT HIGH SPEED NMOS. DYNAMIC RAM. THEY ARE EQUIVALENT TO THE MOSTEK, TEXAS INSTRUMENTS, OR MOTOROLA 4116-3. * 200 NSEC ACCESS TIME, 375 NSEC CYCLE TIME. * 16 PIN TTL COMPATIBLE. * BURNED IN AND FULLY TESTED. * PARTS REPLACEMENT GUARANTEED FOR ONE YEAR. \$8.50 EACH IN QUANTITIES OF 8

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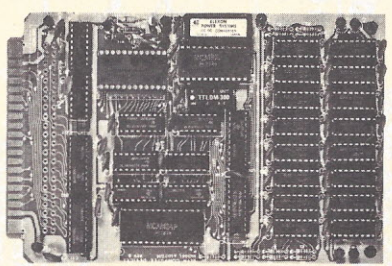
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RELIABLE/COST EFFECTIVE EXPANDABLE RAM FOR 6502 AND 6800 SYSTEM—AIM 65-KIM*SYM*PET*S44-BUS * PLUG COMPATIBLE WITH THE AIM-65/SYM EXPANSION CONNECTOR BY USING A RIGHT ANGLE CONNECTOR (SUPPLIED) MOUNTED ON THE BACK OF THE MEMORY BOARD.

- * MEMORY BOARD EDGE CONNECTOR PLUGS INTO THE 6800 S 44 BUS.
- * CONNECTS TO PET OR KIM USING AN ADAPTOR CABLE.
- * RELIABLE—DYNAMIC RAM WITH ON BOARD INVISIBLE REFRESH—LOOKS LIKE STATIC MEMORY BUT AT LOWER COST AND A FRACTION OF THE POWER REQUIRED FOR STATIC BOARDS.
- * USES +5V ONLY, SUPPLIED FROM HOST COMPUTER.
- * FULL DOCUMENTATION, ASSEMBLED AND TESTED BOARDS ARE GUARANTEED FOR ONE YEAR AND PURCHASE PRICE IS FULLY REFUNDABLE IF BOARD IS RETURNED UNDAMAGED WITHIN 14 DAYS.

ASSEMBLED WITH 32K RAM	\$419.00
& WITH 16K RAM	\$349.00
TESTED WITHOUT RAM CHIPS	\$279.00
HARD TO GET PARTS (NO RAM CHIPS)	
WITH BOARD AND MANUAL	\$109.00
BARE BOARD & MANUAL	\$49.00

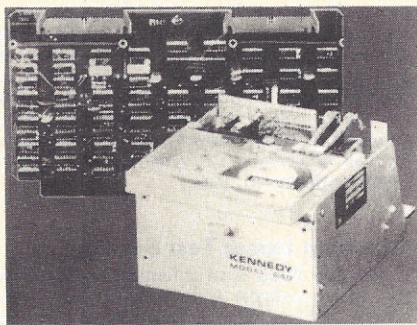
PET INTERFACE KIT—CONNECTS THE 32K RAM BOARD TO A 4K OR 8K PET. CONTAINS: INTERFACE CABLE, BOARD STANDOFFS, POWER SUPPLY MODIFICATION KIT AND COMPLETE INSTRUCTIONS. \$49.00



TAPE

Intelligent Cartridge Formatter

An intelligent microprocessor-based formatter, for use with Kennedy's Model 640 8-inch disk backup cartridge transport, uses an advanced data recovery system employing group code recording (GCR) techniques to reduce host com-



puter overhead. The Model 650 simplifies peripheral controller design since the same bus and signal conventions are used for both disk drive and backup cartridge controllers. Contact: Kennedy Co., 1600 Shamrock Ave., Monrovia, CA 91016.

CIRCLE INQUIRY NO. 350

Removable Mass Storage

The Dualtape-58 is a removable mass storage unit for mini and microcomputers that can be used with DEC, SEL and Data General systems. The unit is capable of holding 256K bytes on each of two removable cassette tape cartridges. An intelligent internal controller allows the computer to randomly access any of the 1024 blocks of storage. A high speed search mode gives an average access time of 9.3 seconds. Contact: General Digital Corp., 3322 S. Memorial Pkwy., Huntsville, AL 35801.

CIRCLE INQUIRY NO. 351

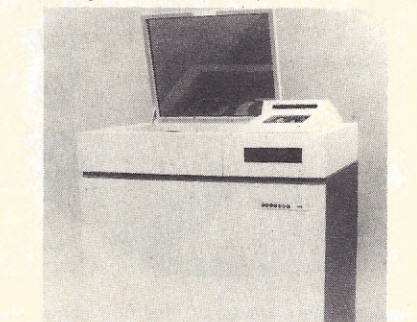
High Speed Tape Drive

The Series 6500 is a 75 ips, 9-track, vacuum column, magnetic tape drive with a rated transfer speed of 120K bytes per second. A dual-density drive records in either 800 bpi Non-Return to Zero IBM (NRZI) or 1600 bpi Phase Encoded formats on approved half-inch magnetic tape. Reels of up to 10½ inches in diameter may be used. The drive is designed as a fully interactive peripheral for disk data backup and offline data storage. Contact: Basic Four Corp., P.O. Box C-11921, Santa Ana, CA 92711.

CIRCLE INQUIRY NO. 352

Graphic Controllers

The Models 916 and 920 magnetic tape readers are interconnecting devices between the user's online controller and host computer. The Models 918 and 922 offline/online controllers are intelligent interconnecting devices between

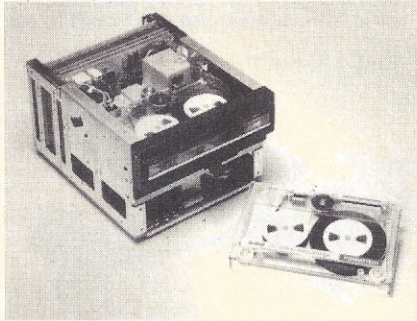


plotters and host computers. All models are free-standing with a 10½-in. read-only magnetic tape transport, operator control panel and English-language operator message display. Contact: California Computer Products, Inc., 2411 W. La Palma Ave., Anaheim, CA 92801.

CIRCLE INQUIRY NO. 353

Data Cartridge Capacity Expanded

Changes in format and specifications of 3M's HCD-75 high capacity cartridge drive gives a 4x6-inch data cartridge more than twice the capacity of a 2400-foot reel of ½-inch, 1600 bpi computer tape or dozens of floppy disks. The drive provides 67 megabytes of user data storage



capacity. Microprocessors are used for tape drive control, diagnostic self-test and error-detection and correction during data read functions. The system is suited for disk backup, program distribution, data interchange, journal and archival applications. Contact: 3M, P.O. Box 33600, St. Paul, MN 55133.

CIRCLE INQUIRY NO. 354

Mag Tape Capability Added

The MSI/2732 Data Communication/Receiver has been enhanced with off-line storage capability using a magnetic tape subsystem. Terminal users in the field transmit collected data to the unit which, operating as a standalone dual-line receiving system, accepts the data and stores it for future use. With magnetic tape capability, the user can choose between this media or a one-to-four floppy disk subsystem for off-line storage. Contact: MSI Data Corp., 340 Fischer Ave., Costa Mesa, CA 92626.

CIRCLE INQUIRY NO. 356

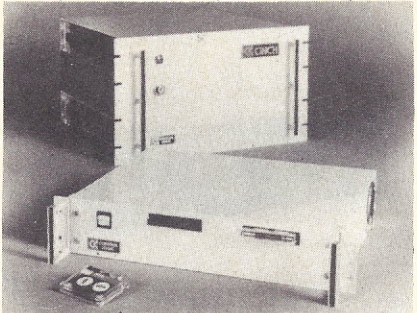
Mass Storage Unit

The Cassette Cartridge Mass Storage Unit provides random access, low cost data storage with a controller which allows it to function much like a disk. The RDS-38 reads, writes and searches for data in blocks rather than serially, providing improvements in access time. The unit incorporates the DEC TU-58 cartridge tape subsystem for direct interface to a mini or microcomputer system through a standard EIA interface. Contact: Remtech, Inc., 2603 Artie St., Suite 21, Huntsville, AL 35805.

CIRCLE INQUIRY NO. 376

Industrial Monitor and Control System

The Dual Drive DEc Tape II (TU-58) Cartridge Tape System for the Cinch industrial monitor and control system provides on-line data storage for monitoring up to 64 A/D channels and/or 96 discrete signals. Enhancing program development, the device permits off-line process-

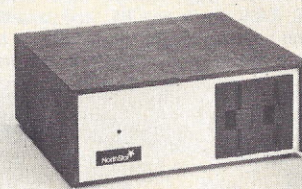


ing of previously recorded data, or allows data transport to a central computer site. With a capacity of 256KB per drive, the system is fully software supported by the resident, real time, multi-tasking operating system; program development is in BASIC. Contact: Control Logic, Inc., 9 Tech Cir., Natick, MA 01760.

CIRCLE INQUIRY NO. 355

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INTERTUBE II SMART TERMINAL	995	725
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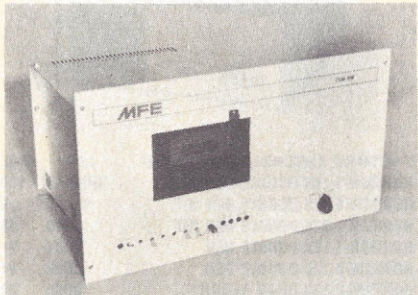
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CIRCLE INQUIRY NO. 80

TERMINALS

Digital Cassette Data Terminal

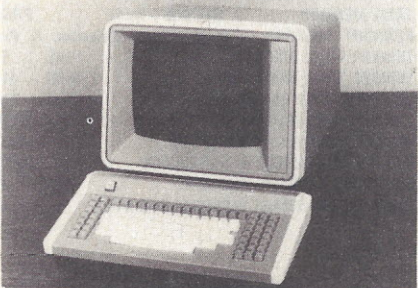
The MFE Model 2500 microprocessor-based terminal offers edit, search and rack mount options. Standard features include RS232C or 20mA current loop, multiple input voltage frequency, RAW check via CRC, and cassette drive. The unit operates locally into a CRT or terminal printer or on-line into a modem. In edit mode/re-



ceive, it terminates the record by keying on the carriage return and padding the line to 86 characters with nulls. In edit mode/send, it transmits a record up to 86 characters, stops, and waits for another command. Contact: MFE Corp., Kewaydin Dr., Salem, NH 03079.
CIRCLE INQUIRY NO. 358

Programmable Terminal

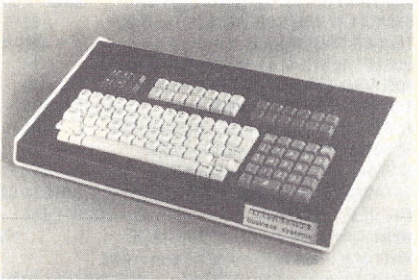
With the Model 850 the host computer can be dialed up automatically, and the terminal can be called automatically by phone. A separate current loop enables the unit to assume the receive functions of a telex machine; an optional transmit loop is also available. Other capabilities include pass



words, telephone numbers, and delimiters. A one-line status area provides information on important messages and the status of the machine. It includes 8K PROM for programming, 4K or 16K RAM for buffer and screen storage, and 15-inch screen. Contact: Megadata Corp., 35 Orville Dr., Bohemia, NY 11716.
CIRCLE INQUIRY NO. 359

Word Processing Keyboard

The Algorithmics KB-2100 extended English keyboard is for its line of ALGO-2100 word processing and office information systems. The detachable keyboard features 113 keys arranged in five clusters. The main keypad and numeric pad



produce 96 characters including punctuation. A shift key allows main pad to produce 20 additional symbols, either technical/math or foreign characters. Functional clusters across the top permit text editing functions. Contact: Algorithmics, Inc., 177 Worcester Rd., Wellesley, MA 02181.
CIRCLE INQUIRY NO. 360

TEST EQUIPMENT

Long Wave Ultraviolet Meter

The DM-365N is a pocket-sized digital radio-meter that measures ultraviolet radiation in the spectral range of 320 to 380 nanometers. The unit is NBS traceable, and is calibrated by pyro-



electric methods. It features three sensitivity ranges from 0-20,000 $\mu\text{W}/\text{cm}^2$ with a $3\frac{1}{2}$ digit LED readout. Contact: Spectronics Corp., 956 Brush Hollow Rd., Westbury, NY 11590.
CIRCLE INQUIRY NO. 361

Systems Counter

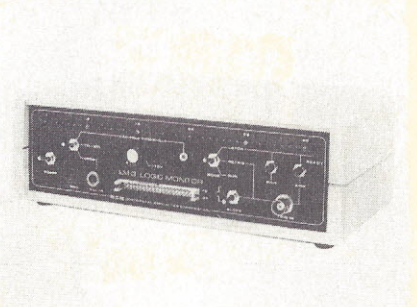
The Model 5316A Universal Counter features extensive Hewlett-Packard interface bus capability and reciprocal-taking frequency measurement technique. The instrument measures frequency, frequency burst, frequency ratio, time interval,



time interval average and period and totalizes. Its two input channels operate over the counter's 100 MHz frequency range. Includes an 8-digit LED display (plus exponent), trigger level and sensitivity controls for both channels and push-button measurement selection.
CIRCLE INQUIRY NO. 362

Logic Monitor

The Model LM-3 Logic Monitor is a 40-channel state-indicating logic test instrument offering triggerable latching modes and selectable logic thresholds. It permits simultaneous monitoring of up to 40 logic points selected by the user. Three operating modes permit it to follow data, latch on the first trigger only or latch on the first



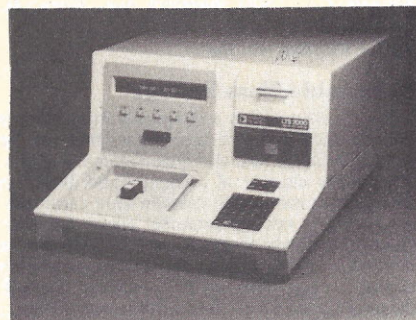
trigger and update with succeeding triggers; in addition, a manual pushbutton latch is provided. The logic high threshold voltage is user-selectable. All 40 data channels and the trigger input channel share the same user-selected threshold. Contact: Global Specialties Corp., 70 Fulton Terrace, New Haven, CT 06509.
CIRCLE INQUIRY NO. 364

Data Line Analyzer

The Model 4050 RS232 Line Analyzer performs display key signals, interrupt selected signal paths, and patch and jumper new configurations. The display function continuously monitors and displays eight signals of the EIA-RS232 data path. Seven LEDs are permanently assigned to display transmitted data, received data, request to send, clear to send, data set ready, data terminal ready and carrier detect. The eighth LED is programmable and can be jumped to any of the 24 signals in the RS232 interface. The device derives its power from the signal line. The interrupt function is performed by 24 miniature slide switches. The patch and jumper function is performed using three sets of 24 test points. Contact: Remark International, 4 Sycamore Dr., Woodbury, NY 11797.
CIRCLE INQUIRY NO. 363

Benchtop Linear Test System

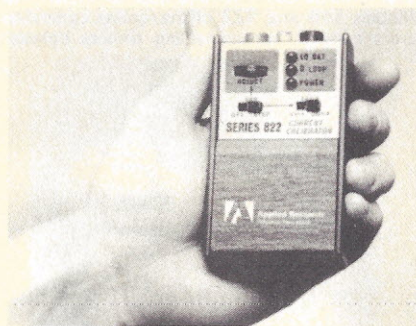
The LTS 2000 is an automatic instrument to test analog-to-digital and digital-to-analog converters, and any other analog function such as operational amplifiers, comparators, voltage regulators, isolation amplifiers and CMOS switches. The system is designed for incoming inspection in plant locations, as well as for device selection



and grading, engineering tests and quality control. An operator inserts a device, presses the start test button, and a pass or fail message appears on the 40-character dot matrix display. Grading, selection and binning messages can also be displayed, and/or printed out on the integral 20-column thermal printer. Contact: Analog Devices, Inc., 360 Audubon Rd., Wakefield, MA 01880.
CIRCLE INQUIRY NO. 365

Current Loop Calibrator

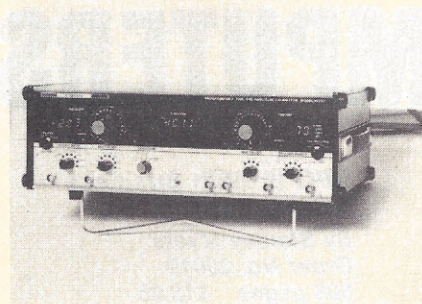
The Series 822 pocket-size current source is for plant instrument technicians and field servicemen. The device has 0.1% accuracy on 4, 12 and 20 mA dc fixed outputs. The 20-turn thumb-wheel vernier dial permits adjustable current outputs anywhere over the 4-20 mA range. Integrated circuits insure no loss of accuracy for any



load resistance between 0 and 600 ohms. The continuous monitoring of unit operation by LEDs indicates that power is on, when the battery is low, and when the current loop is open or the calibrator cannot supply the requested current. Contact: Applied Research and Technology, Inc., 980 W. Henderson Rd., Columbus, OH 43220.
CIRCLE INQUIRY NO. 366

Time and Amplitude Test Set

The Model 6125C-Option 60 programmable instrument offers talker/listener operation of all programmable controls by means of the standard IEEE-488-1978 interface bus. It may also be operated manually. The device is a versatile, port-



able and lightweight four-in-one instrument package for precision calibration of oscilloscopes, digital frequency counters, spectrum analyzers and basic voltmeters. Contact: Ballantine Laboratories, Inc., P.O. Box 97, Boonton, NJ 07005. CIRCLE INQUIRY NO. 367

Multichannel FFT Analyzer

The 6080 can be used as a simple multichannel FFT analyzer or combined with peripherals and computers to operate as a 128-channel real time analyzer, high-speed data acquisition system, or model analysis system. Applications include recording and analyzing the response of any structure subjected to dynamic forces, such as fans, machine tools, turbines, shipping containers, and auto or freight car components. It also provides powerful data acquisition and analysis capabilities in a field-portable instrument. Contact: Zonic Technical Laboratories, Inc., 2000 Ford Cir., Milford, OH 45150.

CIRCLE INQUIRY NO. 368

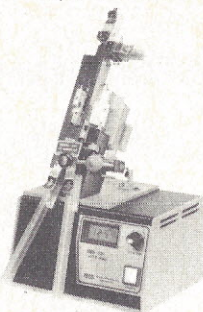
Line Monitors/Interactive Analyzers

The Datascope series of line monitors and interactive analyzers are cost-effective, operations-efficient test and diagnostic tools. The D-580 series provide bit-level handling, high-speed monitoring, simplified set-up and operation, block check character generation and checking, character trapping, BERT testing and idle suppression on data storage. Four models are available, ranging from a simple set-up with a 2K character input buffer to a high-speed device for the user of advanced protocols. Contact: Spectron, 344 Albany Rd., Morristown, NJ 08057.

CIRCLE INQUIRY NO. 369

Temperature Option for DIP Testing

The EMS-201 Hot Rail is an option for Electro-Mechanical Systems manual DIP handlers in order to test ICs at elevated temperatures. The thermoelectric tracks allow devices to be tested from 125 °C. Temperature can be applied to de-

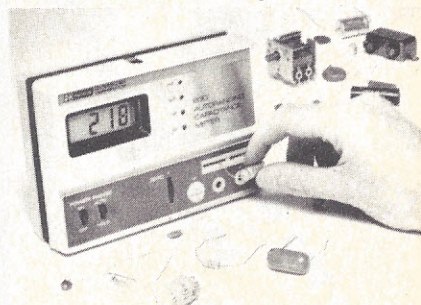


vices for long or short test times; the system regulates device temperature to within 2 °C. The EMS-201 track is accurate to within 1 °C, and it provides LCD digital display of temperature. Contact: Electro-Mechanical Systems, Inc., 1871 W. County Rd. C, St. Paul, MN 55113.

CIRCLE INQUIRY NO. 370

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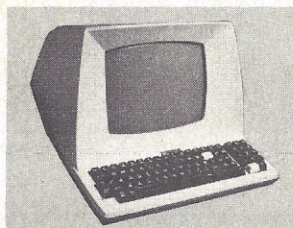
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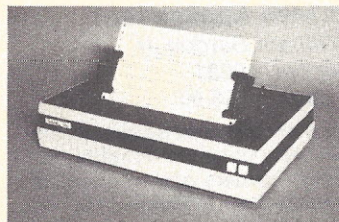
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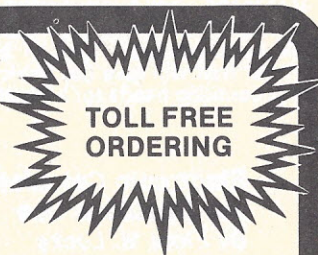
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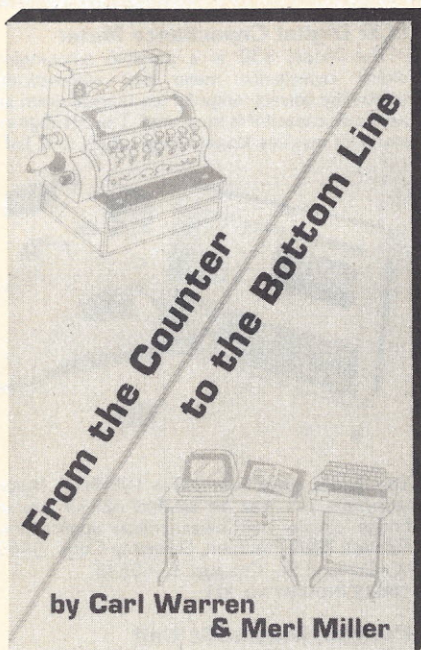
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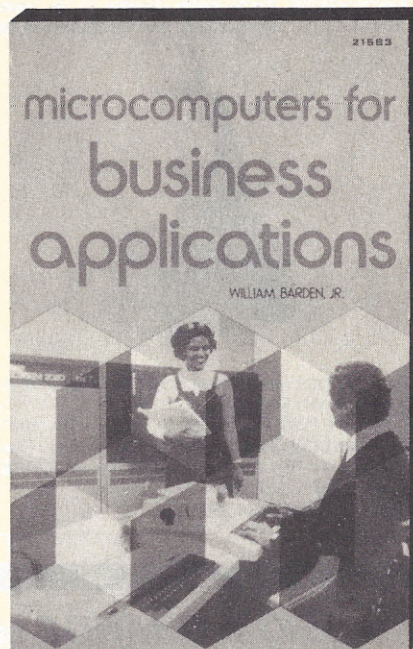
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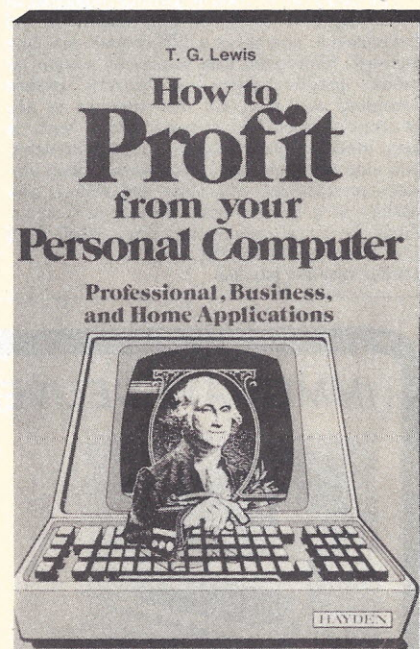
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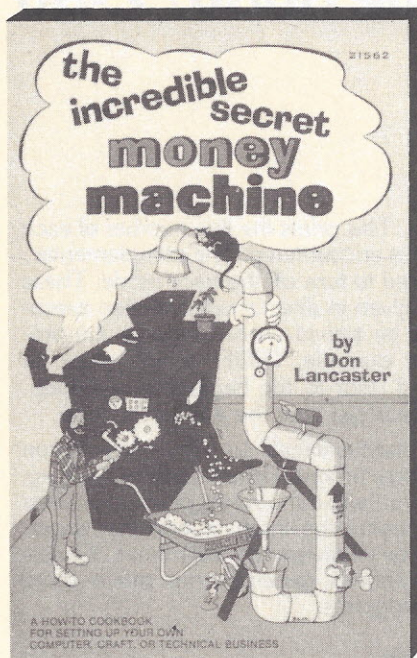
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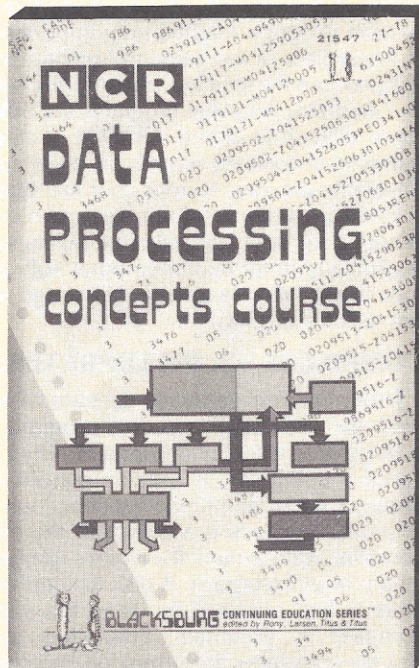
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BASCOM

Microsoft's BASIC Compiler for the 8080/Z-80

Review by Alan R. Miller

The choice of a computer language for the processing of business records, for general mathematical calculations, or for game playing is based on several factors. Among the more important criteria are the availability of suitable software, the readability of the resulting code, and, in the case of microcomputers, program size. Micros will typically have less memory than minicomputers or large mainframe computers. Consequently, the memory size of the ultimate, executable program may be very important.

Regardless of the particular computer, assembly language will produce the smallest, and also the fastest executable code. But assembly language programs are difficult to write and even more difficult to debug. COBOL is extensively used for the handling of business records on larger computers. The source programs are easy to read, but the syntax is complicated.

BASIC was the first high-level microcomputer language. It is useful for both scientific and business applications. There is probably more microcomputer software written in BASIC than in any other language. (Although there are many different dialects of BASIC.)

COMPILERS VS. INTERPRETERS

Programming generally consists of two separate phases. First, the user writes a source program using ordinary symbols such as letters and numbers. Then a separate program, called a processor, is used to convert the symbolic source program into a set of binary instructions. There are two types of processors; one is a compiler, the other an interpreter. A compiler will convert the source program directly into the binary object program. A disk file containing the source program is first prepared by using the system editor; then the compiler is executed. This step produces a separate disk file containing the corresponding object program. Finally, a loader program copies the object program from disk into memory for execution and further conversion may be performed. Thus, three separate programs are needed: the system editor, the compiler and the loader.

Interpreters work a bit differently. The user's source program and the interpreter are coresident in memory at all times. The source program may be generated with the system editor, or it can be written directly under control of the interpreter's built-in editor. During execution, the entire source program, including all of the comments, remains in the memory.

There are advantages and disadvantages to both approaches. Compilers are typically used for FORTRAN, COBOL, Pascal and assembly language. Interpreters are usually used for BASIC and APL. CBASIC (Interface Age, Aug. 79) is an interesting mixture of both types. A compiler is used to produce a pseudocode intermediate file which is then interpreted by a runtime monitor.

The advantage of an interpreter is that execution can be stopped at any time. The current value of any variable can be printed or even changed. Then the computation can be resumed. Microsoft's BASIC contains a TRON command that

turns on the trace mode. This prints the line number of each program statement as it is encountered. The complementary command TROFF is used to turn off the trace mode. These two commands can be given in direct mode between execution steps, or they may be turned on or off within the program during a run. For example, TROFF might appear in the source program just prior to the beginning of a loop. Then TRON could appear just after the end of the loop.

There are several disadvantages to the interpretation approach. Since the source program must reside in memory, large programs cannot run without a series of overlays. Furthermore, a computer instruction inside a loop that is executed 500 times must be reinterpreted 500 times. Consequently, interpreted programs generally run much more slowly than compiled programs.

A COMPILING BASIC

Version 5 of Microsoft's powerful interpretive BASIC has most all the features one could ask for. Variable names can contain up to 40 characters, and they can be explicitly typed as REAL, DOUBLE PRECISION (17 digits), STRING or INTEGER. Constants can be represented in octal and hexadecimal. There is a Pascal-like WHILE...WEND loop. More than one statement can be placed on a line, and one statement can be spread over several lines.

The feature of long variable names requires that a space be used after all reserved words. Thus a FOR loop must look like this:

```
FOR I=M TO N
```

The more usual BASIC interpreters also allow the expression:

```
FOR I=MTON
```

This is a valid expression in version 5 BASIC. But it is interpreted as a definition of the variable called FORI rather than as the start of a loop. For a system editor with a global replace command, the required spaces can easily be added to existing programs. With Word-Master or ED, the command:

```
MSPRINT^ZPRINT ^ZOTT
```

will add a space after each occurrence of the command PRINT. BASIC's built-in editor cannot be used for this since it has no global search and replace commands.

Version 5 is also available as a compiler, with nearly all of the features of the interpretive version. The two types beautifully complement each other. The user can develop a new program using the interpretive version, where debugging is very easy. Then, when the source program is working satisfactorily, it can be compiled to run faster.

SPEED COMPARISONS

When speed comparisons have been published for popular BASIC interpreters, Microsoft's BASIC consistently

produces one of the best times. This reviewer performed some practical speed tests by repeatedly solving 14 simultaneous linear equations. CBASIC and Microsoft's interpreter BASIC both performed the task in about the same time. As expected, there was a dramatic difference with the compilers. Microsoft's compiling BASIC and their FORTRAN consistently performed the task in one-tenth the time required for the interpreters. (The compiling BASIC was a little faster than the FORTRAN.) These include only the actual execution time; they do not include the time needed to load the interpreter, or the time needed to compile and load the source program. These latter times vary from a few seconds to several minutes, but the load time is needed only once. After the load step, the execution can be repeated many times. Load time or compile time spread over many executions, becomes negligible.

QUBIC

Another speed comparison was made by programming the popular game known as Qubic. This is three-dimensional tic-tac-toe wherein the programmer plays against the computer. When run under the interpretive version of BASIC, each move by the computer required about one minute. When the BASIC source program was compiled, however, the computer took a maximum of three seconds for each move, and the game became fun.

BASIC SORTING ROUTINE

Sorting of records is a common computer activity. Several sorting algorithms have been developed for this purpose. One of the easiest routines to understand and program is the bubble sort. Unfortunately, this is also the slowest. One of the fastest is the Shell-Metzner algorithm. Listing 1 gives a stand-alone BASIC version of the Shell sort, which can be used to sort ASCII disk files. Actually, an existing unsorted disk file is used for program input, and a new, sorted disk file is created by the BASIC program. The program prompts the user for both disk filenames. The entire name must be entered, including the decimal point and the file type. Filenames must be upper-case. The routine can be easily altered to sort real variables, integers or a mixture of the two by changing the INPUT # and PRINT # statements.

The old input file is designated as logical device #2 and the new output file is declared as device #1. An entire line is read at one time with the LINE INPUT #2 command. New lines are written with the PRINT #1 command.

Sorting routines typically have a rotation step when two items are interchanged. For example, X(I) and X(J3) can be swapped with the lines:

```
HOLD = X(I)
X(I) = X(J3)
X(J3) = HOLD
```

But with Microsoft BASIC there is a better way. The SWAP command accomplishes the task in a single statement:

```
SWAP X(I), X(J3)
```

This is a powerful command, especially for string operations. In the execution, data is not really moved, only the pointers are interchanged. As a result, there is a considerable saving of time.

Sorting of string records is a task that BASIC is ideally suited for. The records (lines) in the disk file do not have to be blocked. That is, the lines of the file may be of different length. This sorting program can be run either with the interpretive version of BASIC or with the compiling version.

PROGRAM EXECUTION

Microsoft uses a standard format for four programs: The FORTRAN, COBOL, and BASIC compilers, the macro

assembler. In each case, the user writes a source program with the system editor. Then the appropriate compiler is used to produce a binary relocatable disk file. Finally a common linking loader is executed to combine the appropriate modules into a memory image needed for the run step. All four types of program modules can be linked together at run time. Thus it is possible to write commonly used subroutines in any of these four languages and place them into a single library file. These might include a random-number generator, a time-of-day routine, etc.

One can write string routines in BASIC, mathematical routines in FORTRAN or BASIC, business routines in COBOL, and systems routines in assembly language. All four types can then be combined into a single program at run time.

The BASIC CALL statement uses the same format as FORTRAN:

```
CALL RANDOM( SEED, INTGER, RNUM)
```

Pointers to the arguments are passed in the three CPU double registers HL, DE and BC. If there are more than three parameters, the BC register points to a stack of pointers for the remaining parameters.

OPTIMIZATION

The compiling version of BASIC contains an optimizer similar to those found in large, mainframe computers. Certain mathematical operations are restructured into a more efficient form. Notice that this may make speed comparisons meaningless. For example, division is a slower operation than multiplication. Consequently, the expression:

$$Z = A / B / C / D$$

is converted to the faster but equivalent operation:

$$Z = A / (B * C * D)$$

Another type of restructuring occurs when common expressions are encountered. The line:

$$A(I, K, L) = B(I, K, L)$$

requires conversion of a three-dimensional index into a one-dimensional pointer. In this case, the compiler evaluates the expression only once, then saves it for use each time it is needed.

RANDOM NUMBERS

The version 5 BASICs include a very good random number generator that can be easily checked by calculating the mean and the standard deviation on a run of numbers. The mean value is the average, and the standard deviation tells how much the values are spread about the mean. The mean value should be 0.5 and the standard deviation should be the reciprocal of the square root of 12 (0.2887). Listing 2 gives a BASIC program for computing these two values.

But the same sequence of random numbers occurs each time that BASIC is started up. Thus, games such as Star Trek or Shooting Stars will always begin the same way if the random number generator is called. To avoid this problem, the RANDOMIZE command can be given at the beginning of the program. This will request a random seed from the user.

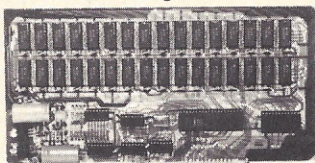
For a Z-80 CPU, BASIC can read the Z-80 refresh register. This register is incremented after each instruction and will be different each time BASIC is started.

CONCLUSION

The Microsoft compiling BASIC is a first. The combination of the interpreting and the compiling BASICs produce a powerful complementary pair for general program development. It will be interesting to see how this combination holds up against the growing popularity of Pascal. □

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CIRCLE INQUIRY NO. 81

LISTING 1 BASIC program for sorting disk files

```

10 / BASIC Program for sorting an ASCII disk file
20 /      by the Shell-Metzner method
30 /
40 / Written by Alan R. Miller
50 /
60 DEFINT I-N
70 DIM A$(200)
80 /
90 PRINT
100 PRINT "Enter file names in upper case-letters."
110 PRINT "File names need not be embedded in quotes."
120 PRINT
130 INPUT "What is the name of the original file"; OLD$
140 INPUT "What name do you want for the new file"; NW$
150 /
160 OPEN "I", #2, OLD$ : I=0
170 /
180 IF EOF(2) THEN 230
190 I = I+1
200 LINE INPUT #2, A$(I) / Read a line from old file
210 GOTO 180
220 /
230 N = I
240 /
250 / This starts the actual sort routine
260 /
270 J4 = N
280 J4 = J4 \ 2
290 IF J4 = 0 THEN 410 / Done
300 J2 = N - J4
310 J = 1
320 I = J
330 J3 = I + J4
340 IF A$(I) <= A$(J3) THEN 380
350 SWAP A$(I), A$(J3)
360 I = I - J4
370 IF I >= 1 THEN 330
380 J = J + 1
390 IF J > J2 THEN 280
400 GOTO 320
410 OPEN "O", #1, NW$
420 /
430 / Write sorted data to disk
440 /
450 FOR I=1 TO N
460 PRINT #1, A$(I)
470 NEXT I
480 CLOSE #1
490 /
500 / Print sorted file on console
510 /
520 FOR I=1 TO N
530 PRINT A$(I)
540 NEXT I
550 /
560 END

```

LISTING 2 Program to test random number generator

```

10 / BASIC Program to test the
20 /      random number generator
30 /
40 / Written by Alan R. Miller
50 /
60 DEFINT I-N
70 /
80 N = 50
90 SUM = 0 : SUMSQ = 0
100 FOR I = 1 TO N
110 A = RND
120 SUM = SUM + A
130 SUMSQ = SUMSQ + A * A
140 NEXT I
150 AVER = SUM / N
160 STDDEV = SQR((SUMSQ - SUM*SUM/N)/(N-1))
170 PRINT "Average = "; AVER; ", Stand dev = "; STDDEV
180 GOTO 90
190 /
200 END

```




An Insulation Optimization Program

By F. Stephen Andes, III and Brian Sher

Londe-Parker-Michels, Inc.
7438 Forsyth, Suite 202, St. Louis, MO 63105

No other area will affect your pocketbook in the years to come as will energy costs. Just survey your energy bills (oil, electricity, gas, etc.) over the last couple of years and you will get a glimpse of the current escalating rate of energy cost. A simple projection of this rate into the future shows energy costs will increase approximately 200% of their current value in just ten years.

Out of this situation, the question arises, how can I cut my energy bills and not declare bankruptcy in ten years? A partial answer is to continue reading this article because it describes the computer code INSULATE whose primary purpose is to guide you on how to cut energy costs by the addition of insulation to a home or building. This addition would reduce the energy loss through walls, doors, windows and roof where approximately 50 to 60% of a building's energy is dissipated.

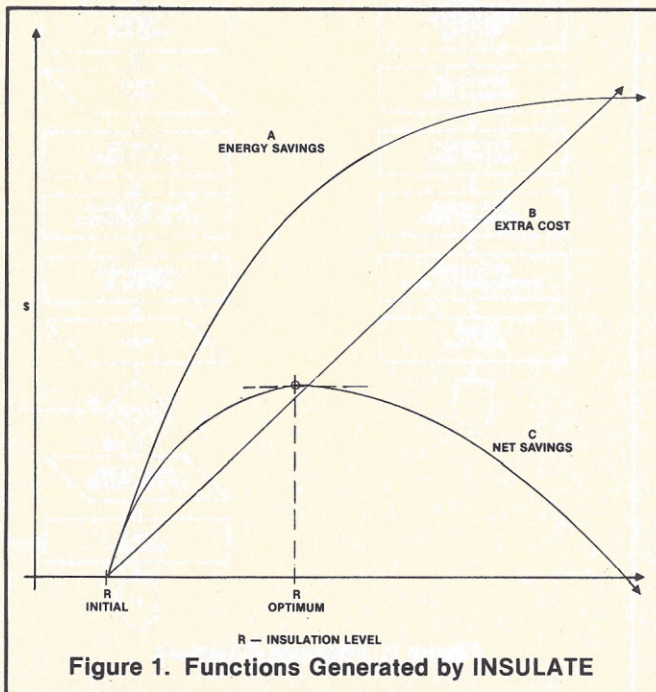
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INSULATE

INSULATE METHODOLOGY

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CIRCLE INQUIRY NO. 85

SOFTWARE APPLICATION

increase in the present insulation level of the building using a present value life-cycle cost analysis. This savings is realized by a reduction in the winter/summer energy losses through the building surface due to extra added insulation. This is shown as Curve A in Figure 1.

The second function is the cost curve. The cost curve describes the investment or cost that will be required to increase the insulation to greater incremental levels above the existing level. Curve B is the cost curve.

The third function gives the net savings (Curve C) and is simply the difference between the total savings realized by additional levels of insulation less the cost (investment) to insulate to those levels.

It is from this last curve that economic optimum insulation R-level is determined. That level is defined as the point where the net savings curve (Curve C) is a maximum. In terms of economics the R-optimum is the insulation level which would maximize net savings or profit. It's like an investment. By investing with the optimum insulation level, you bring the greatest return.

Additionally, the program also calculates the payback, or time it will take to recover the cost to insulate to the optimum point. This payback calculation considers the inflation rate, cost of money and the discount rate. A simplified version of this is also performed by simply dividing initial costs by the estimated first year savings. This latter calculation is the most straightforward approach and is termed the simple payback methodology.

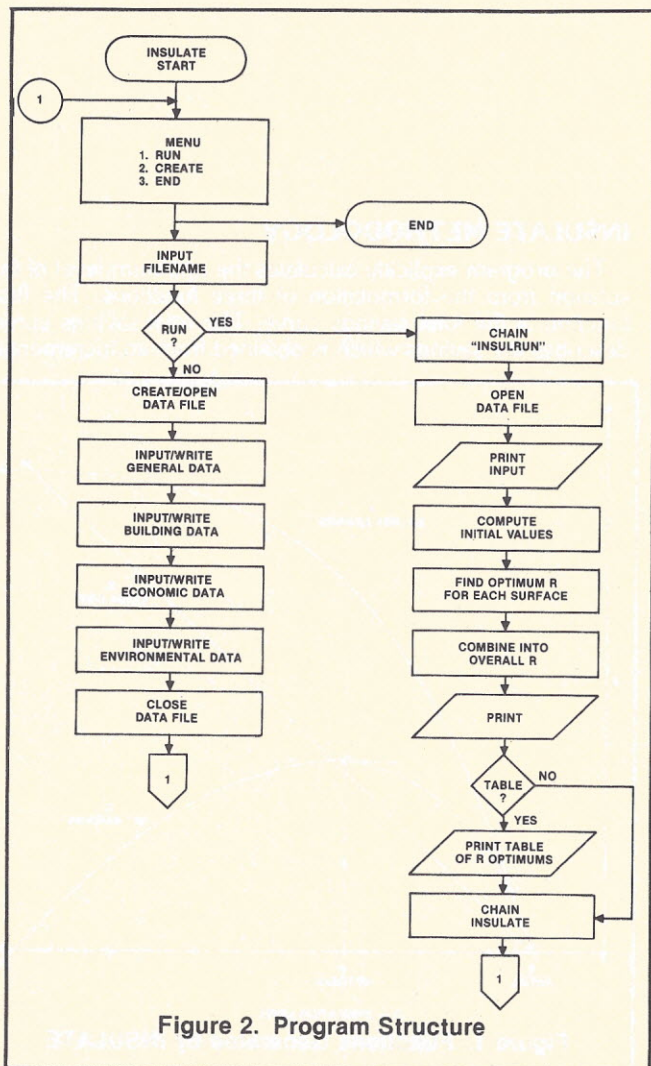


Figure 2. Program Structure

INSULATE PROGRAM

The code is structured as outlined in Figure 2 and has four discrete input sections:

- Section 1 General Information
- Section 2 Building Information
- Section 3 Economic Information
- Section 4 Environment Information

All the sections are self-prompting and for the most part self-explanatory. However, a few comments are necessary in some sections.

Table 1. Surface Input (\$/R/Sq.Ft. is Known)

(\$/R/Sq.Ft. is Known)				
Surface Number	Name of Surface	Area (Sq.Ft.)	Current R-Level	\$/R/Sq.Ft.
1.				
2.				
3.				
.				
.				
.				
.				
30.				

In Section 2 Inputs you are prompted in Question 2 with the choice of whether to input Table I or Table II data. You should choose Table I data if you know the cost of insulating per square foot per each additional R level. In other words, for each additional R level, what does it cost you for each square foot you need to cover? Typically, this value can run from \$.01 to \$1.50.

If you do not know what this value is then you need to get a quote from an insulation dealer for a specific job and then use Table II. The program internally will calculate this value for you based on your inputs to the Table II promptings. The various types of insulation that the Table II option uses are given in Table III.

Table 2. Surface Input (\$/R/Sq.Ft. is Not Known)

(\$/R/Sq.Ft. is Not Known)						
Surface Number	Name of Surface	Area Sq.Ft.	Current R-Level	Type of Insulation *	No. of Inches	Cost to Insulate
1.						
2.						
3.						
4.						
.						
.						
.						
30.						

*Note Table III for the input code number for type of insulation.

Also, in Section 4 Input 1.B requires what is called degree-day information, and may not be readily available to most people. For this reason I have included a list of degree-days for most major cities. If you don't live in one of them then interpolate or adjust the degree-days of a city near you that is given by the percent that you think your city is colder or warmer.

Typical input and output are reflected by Figure 3. Sections I through IV are all input while Sections V and VI give the output results for those input values.

If you have further questions or don't want to type the code in yourself, then contact me for further documentation, an input workbook and a copy on North Star compatible disk.

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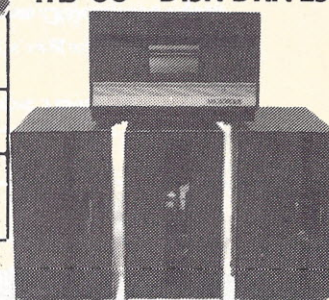
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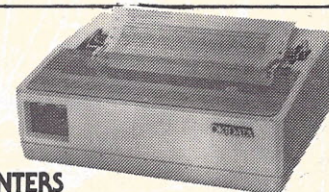
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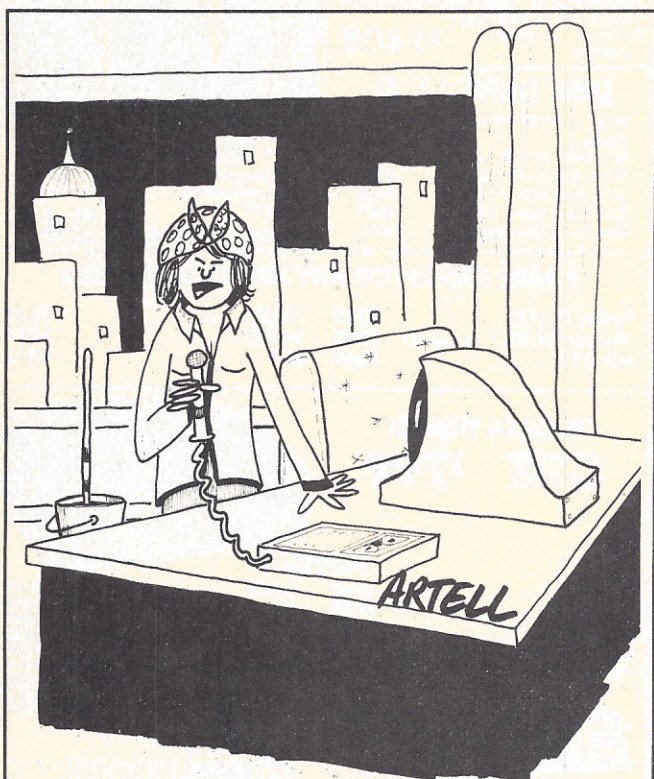
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CIRCLE INQUIRY NO. 88



"So, in conclusion, if you want your wastebasket emptied, you'd better put the Star Wars game back on the computer."

SOFTWARE APPLICATION

SECTION 1 THIS PROGRAM ESTABLISHES THE ECONOMIC OPTIMUM FOR BUILDING INSULATION FOR BOTH WINTER HEATING AND SUMMER COOLING CONDITIONS.

SECTION 2 * * * * * PROGRAM INPUT * * * * *

A WALL	AREA= 150 SQ FT	R VALUE= 2.5	COST/R/SQ FT= .16
A ROOF	AREA= 300 SQ FT	R VALUE= 4	COST/R/SQ FT= .05
A DOOR	AREA= 50 SQ FT	R VALUE= 1.7	COST/R/SQ FT= .54

TOTAL AREA= 500 SQ FT R TOTAL= 3.04

SECTION 3 * * * ECONOMIC VARIABLE INPUTS * *

WHEN THE BUILDING IS	20 YEARS
AND WHEN THE COST OF MONEY IS	13 %
AND WHEN THE TAX RATE IS	48 %
AT A RATE OF FUEL INCREASE OF	18 % PER YEAR

SECTION 4 * * * WINTER/SUMMER ENVIRONMENTAL INPUTS * *

WINTER CONDITIONS	
DEGREE DAYS	5000 PER WINTER
TODAY'S COST OF FUEL IS	.35 \$/THERM
OPERATING AT AN EFFICIENCY OF	75 %

SUMMER CONDITIONS	
OPERATING HOURS OF COOLING EQPMT	1008 HOURS
EQUIVALENT TEMPERATURE DIFFERENCE	30
TODAYS COST OF ELECTRICITY IS	.04 PER KWH

THE FOLLOWING OUTPUT RESULTS

SECTION 5 * * * ECONOMIC OPTIMUM BUILDING INSULATION * * * BASED ON WINTER/SUMMER CONDITIONS * *

PRESENT VALUE OF A THERM OF ENERGY \$ 23.72
FIRST YEAR ENERGY SAVINGS \$ 83.98

R OPTIMUM-R VALUE AT PT OF DIMINISHING RETURNS

R AT DIMINISHING RETURN 18.59
WILL GIVE A FUEL COST SAVINGS OF \$ 5106.17
FOR AN EXTRA INVESTMENT OF \$ 832.33
RESULTING IN A NET SAVINGS OF \$ 4273.83
THE EXTRA INVESTMENT WILL BE PAID BACK
USING THE PRESENT VALUE METHOD IN 7.13 YEARS
USING THE SIMPLE PAYBACK METHOD IN 6.18 YEARS

R VALUES OF BUILDING SUB-ELEMENTS

A WALL	R= 15.23 WITH A COST= 305.6 (6.6 YEAR PAYBACK)
A ROOF	R= 27.25 WITH A COST= 348.75 (6.1 YEAR PAYBACK)
A DOOR	R= 8.29 WITH A COST= 177.98 (7.8 YEAR PAYBACK)

SECTION 6 INSULATION LEVELS FOR VARIOUS BUILDING OCCUPANCY LEVELS

BUILDING TIME PERIOD (YEARS)	INVESTMENT NECESSARY (\$)	AVERAGE BUILDING INSULATION R-LEVEL	PRESENT VALUE PAYBACK (YEARS)
1	0	3.04	0
2	24.06	3.53	1.66
3	67.55	4.34	2.11
4	110.9	5.15	2.49
5	152.01	5.92	2.83
6	192	6.66	3.14
7	231.54	7.4	3.44
8	271.1	8.14	3.73
9	311.03	8.88	4.02
10	351.59	9.64	4.3
11	393	10.41	4.58
12	435.46	11.2	4.86
13	479.15	12.01	5.14
14	524.23	12.85	5.41
15	570.86	13.72	5.7
16	619.17	14.62	5.98
17	669.33	15.56	6.26
18	721.48	16.53	6.55
19	775.76	17.54	6.84
20	832.33	18.59	7.14

Figure 3. INSULATE Output

INSULATE SYSTEM REQUIREMENT

INSULATE is currently written for a North Star dual-disk system with 32K RAM memory. If you don't have two disk drives then you will have to change the file creation and open commands, which is not a difficult job to do.

INSULATE runs under North Star BASIC version 6 release 5. The CRT commands are presently programmed for a Hazeltine 1500 and need to be modified for other units. This is line 1280 in the INSULATE program. The program will run fine without this change but it just won't look as nice. The output can be routed to either a hardcopy printer or to a CRT. Minimum hardware therefore consists of a CRT and the North Star computer. A printer may be added for hard-copy output.□

Table and program follow

Table 3. Types of Insulation

Code Number	Type of Insulation	Size	R/Inch	Estimated Cost/R/sq.ft.
1	FIBERGLASS Batts/Blankets	16"-24"wide 3",6"	3.50	.02
2	Loose fill	—	3.00	.01
3	MINERAL WOOL Batts/Blankets	16"-24" wide 3",6"	3.25	.013
4	Loose fill	—	3.75	.013
5	CELLULOSIC FIBER Recycled newspaper	—	3.50	.01
6	SAWDUST	—	2.20	
7	VERMICULITE	—	2.13	.03
8	PERLITE	—	2.70	.04
9	POLYSTYRENE Styrofoam	1",1½",2",2½"	4.50	.06
10	Beadboard	4 x 8 1",1½",2,2½",3"	3.57	.04
11	POLYURETHANE Boards	1"-1½"-2"	6.50	.05
12	Foam urethane	—	6.75	.11
13	UREAFORMADEHYDE	—	4.80	

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ALA. BIRMINGHAM	2551	ROME	3326	HAVRE	8700	PITTSBURGH	5987
HUNTSVILLE	3070	SAVANNAH	1819	HELENA	8129	READING	4945
MOBILE	1560	THOMASVILLE	1529	KALISPELL	8191	SCRANTON	6254
MONTGOMERY	2291	IDAHO BOISE	5809	MILES CITY	7723	WILLIAMSPORT	5934
ALASKA ANCHORAGE	10864	IDAHO FALLS 46W	8475	MISSOULA	8125	R. I. BLOCK IS.	5804
ANNETTE	7069	IDAHO FALLS 42NW	8760	NEBR. GRAND ISLAND	6530	PROVIDENCE	5954
BARROW	20174	LEWISTON	5542	LINCOLN	5864	S. C. CHARLESTON	2033
BARTER IS.	19862	POCATELLO	7033	NORFOLK	6979	COLUMBIA	2484
BETHEL	13196	ILL. CAIRO	3821	NORTH PLATTE	6684	FLORENCE	2387
COLD BAY	9880	CHICAGO	6155	OMAHA	6612	GREENVILLE	2884
CORDOVA	9764	MOLINE	6408	SCOTTSBLUFF	6673	SPARTANBURG	3074
FAIRBANKS	14279	PEORIA	6025	VALENTINE	7425	S. DAK. HURON	8223
JUNEAU	9075	ROCKFORD	6830	NEV. ELKO	7433	RAPID CITY	7345
KING SALMON	11343	SPRINGFIELD	5429	ELY	7733	SIOUX FALLS	7839
KOTZEBUE	16105	IND. EVANSVILLE	4435	LAS VEGAS	2709	TENN. BRISTOL	4143
MCGRATH	14283	FORT WAYNE	6205	RENO	6332	CHATTANOOGA	3254
NOME	14171	INDIANAPOLIS	5699	WINNEMUCCA	6761	KNOXVILLE	3494
SAINT PAUL	11199	SOUTH BEND	6439	N. H. CONCORD	7383	MEMPHIS	3232
SHEMYA	9687	IOWA Burlington	6114	MT. WASH. OBSY.	13817	NASHVILLE	3578
YAKUTAT	9092	DES MOINES	6808	N. J. ATLANTIC CITY	4812	OAK RIDGE (CO)	3817
ARIZ. FLAGSTAFF	7152	DUBUQUE	7376	NEWARK	4859	TEX. ABILENE	2624
PHOENIX	1765	SIOUX CITY	6951	TRENTON	4980	AMARILLO	3985
PRESCOTT	4362	WATERLOO	7320	N. MEX. ALBUQUERQUE	4348	AUSTIN	1711
TUCSON	1800	KANS. CONCORDIA	5479	CLAYTON	5158	BROWNSVILLE	600
WINSLOW	4782	DODGE CITY	4986	RATON	6228	CORPUS CHRISTI	914
YUMA	1217	GOODLAND	6141	ROSWELL	3793	DALLAS	2363
ARK. FORT SMITH	3292	TOPEKA	5182	SILVER CITY	3705	EL PASO	2700
LITTLE ROCK	3219	WICHITA	4620	N. Y. ALBANY	6875	FORT WORTH	
TEXARKANA	2533	KY. COVINGTON	5265	BINGHAMTON (AP)	7286	GALVESTON	2405
CALIF. BAKERSFIELD	2122	LEXINGTON	4683	BINGHAMTON (PO)	6451	HOUSTON	1235
BISHOP	4227	LOUISVILLE	4660	BUFFALO	7062	LAREDO	1396
BLUE CANYON	5507	LA. ALEXANDRIA	1921	CENTRAL PARK	4871	LUBBOCK	797
BURBANK	1646	BATON ROUGE	1560	J. F. KENNEDY INTL	5219	MIDLAND	3578
EUREKA	4643	BURRWOOD	1024	LAGUARDIA	4811	PORT ARTHUR	2591
FRESNO	2492	LAKE CHARLES	1459	ROCHESTER	6748	SAN ANGELO	1447
LONG BEACH	1711	NEW ORLEANS	1385	SCHENECTADY	6650	SAN ANTONIO	2255
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DAYTONA BEACH	879	MINN. DULUTH	10000	YOUNGSTOWN	6417	YAKIMA	4805
FORT MYERS	442	INTERNATIONAL FALLS	10606	OKLA. OKLAHOMA CITY	3725	W. VA. CHARLESTON	5941
JACKSONVILLE	1239	MINNEAPOLIS	8382	TULSA	3860	ELKINS	4476
KEY WEST	108	ROCHESTER	8295	OREG. ASTORIA	5186	HUNTINGTON	5675
LAKELAND	661	SAINT CLOUD	8879	BURNS	6957	PARKERSBURG	4446
MIAMI BEACH	141	MISS. JACKSON	2239	EUGENE	4726	WIS. GREEN BAY	4754
ORLANDO	766	MERIDIAN	2289	MEACHAM	7874	LA CROSSE	8029
PENSACOLA	1463	VICKSBURG	2041	MEDFORD	5008	MADISON	7589
TALLAHASSEE	1485	MO. COLUMBIA	5046	PENDLETON	5127	MILWAUKEE	7863
TAMPA	683	KANSAS	4711	PORTLAND	4635	WYO. CASPER	7635
WEST PALM BEACH	253	ST. JOSEPH	5484	ROSEBURG	4491	CHEYENNE	7410
GA. ATHENS	2929	ST. LOUIS	4900	SALEM	4754	LANDER	7278
ATLANTA	2983	SPRINGFIELD	4561	SEXTON SUMMIT	6254	SHERIAN	7870
AUGUSTA	2397	MONT. BILLINGS	7049	PA. ALLENTOWN	5810		7683
COLUMBUS	2383	GLASGOW	8996	ERIE	6451		
MACON	2136	GREAT FALLS	7750	HARRISBURG	5251		
				PHILADELPHIA	5101		

LISTING 1

```

10 DIM NS(20),AS(300),BS(13),S(30),T(30),U(30)
20 Q0=0\Q1=5\GOSUB1270
30 !TAB(34), "INSULATE"!TAB(34), "COMPUTER"!TAB(36), "CODE"!
40 !TAB(28), "LONDE-PARKER-MICHELIS"!TAB(32), "7438 FORSYTH"
50 !TAB(32), "ST LOUIS, MO"!TAB(31), "(314) 725-5501"!
60 !TAB(33), "VERSION 1.0"!TAB(35), "9/1/79"FOR I=1TO4000\NEXT
70 GOSUB1270
80 !TAB(20), "ENTER OPTION FROM THE FOLLOWING LIST"!
90 !TAB(35), "1 = RUN"!TAB(35), "2 = CREATE NEW FILE"
100 !TAB(35), "3 = END"
110 INPUT "ENTER OPTION= ", G
120 IF G=3 THEN 1290
130 IF G=1 THEN 170
140 IF G=2 THEN 170
150 PRINT "INPUT 1, 2, OR 3"
160 GOTO 110
170 INPUT "FILE NAME (NO MORE THAN 7 LETTERS)", H$
180 IF G=1 THEN 1190
190 CREATE H$+"2", 20
200 OPEN #1, H$+"2"
210 Q1=0\GOSUB1270
220 !TAB(15), "**** GENERAL INPUT INFORMATION ****"!
230 INPUT #1. ENTER THE NAME OF YOUR BUSINESS ", NS!
240 !" #2. ENTER THE # OF THE SEASON(S) YOU WANT TO OPTIMIZE FOR:"
250 !TAB(10), "1 = WINTER"!TAB(10), "2 = SUMMER"
260 !TAB(10), "3 = WINTER/SUMMER"
270 INPUT "ENTER CONDITION ", A1
280 IF A1<4 THEN 310
290 PRINT "INPUT 1, 2, OR 3"
300 GOTO 260
310 !" #3. DO YOU WANT TO CREATE A TABLE OF OPTIMUM"
320 INPUT "INSULATION LEVELS(1=YES, 0=NO) ", A2
330 IF A2<>1 THEN 350
340 INPUT "ENTER NUMBER ", A3
350 GOSUB 1270
360 !TAB(15), "**** BUILDING INPUT INFORMATION ****"!
370 !" #1. ENTER THE NUMBER OF BUILDING SURFACES YOU WANT"
380 INPUT "TO INPUT FOR OPTIMIZATION (MAX OF 30) ", A4!
390 !" #2. ENTER WHETHER YOU ARE GOING TO INPUT FROM"
400 INPUT "TABLE I OR TABLE II(1=TABLE I: 2=TABLE II)= ", C9
410 GOSUB 1270!TAB(15), "**** BUILDING INPUT INFORMATION ****"!
420 IF C9>1 THEN 500
430 !"SURFACE # SURFACE NAME AREA R-LEVEL $/R/SQFT"
440 !CHR$(11), \Q3=9\GOSUB1280!TAB(11), \Q3=12\GOSUB1280
450 !TAB(25), \Q3=6\GOSUB1280!TAB(33), \Q3=7
460 GOSUB1280\Q3=8!TAB(41), \GOSUB1280!CHR$(12)
470 IF A4<=30 THEN 560
480 PRINT "MAXIMUM OF 30"
490 GOTO 350
500 GOSUB 1270!TAB(15), "**** BUILDING INPUT INFORMATION ****"!
510 !"SURFACE # SURFACE NAME AREA R-LEVEL INSULATION TYPE INCHES COST "
520 !CHR$(11), \Q3=9\GOSUB1280!TAB(11), \Q3=12\GOSUB1280
530 !TAB(25), \Q3=6\GOSUB1280!TAB(33), \Q3=7
540 GOSUB1280\Q3=15!TAB(41), \GOSUB1280\Q3=6!TAB(57),
550 GOSUB1280\Q3=6!TAB(64), \GOSUB1280!CHR$(12)
560 WRITE #1, NS
570 WRITE #1, A1, A2, A3, A4
580 FOR Z=1 TO A4
590 Z9=(Z-1)*10+1
600 IF C9>1 THEN 640
610 !TAB(4), Z, TAB(10), \INPUT1 " ", AS(Z9, Z*10)\!TAB(24), \INPUT1 " ", S(Z)
620 !TAB(32), \INPUT1 " ", T(Z)\!TAB(40), \INPUT " ", U(Z)

630 GOTO 840
640 !TAB(4), Z, TAB(10), \INPUT1 " ", AS(Z9, Z*10)\!TAB(24), \INPUT1 " ", S(Z)
650 !TAB(32), \INPUT1 " ", T(Z)\!TAB(46), \INPUT1 " ", G3
660 !TAB(58), \INPUT1 " ", G6\!TAB(63), \INPUT " ", G5
670 IF G3=1 THEN G4=3.5
680 IF G3=2 THEN G4=3
690 IF G3=3 THEN G4=3.25
700 IF G3=4 THEN G4=2.75
710 IF G3=5 THEN G4=3.5
720 IF G3=6 THEN G4=2.2
730 IF G3=7 THEN G4=2.13
740 IF G3=8 THEN G4=2.7
750 IF G3=9 THEN G4=4.5
760 IF G3=10 THEN G4=3.57
770 IF G3=11 THEN G4=6.5
780 IF G3=12 THEN G4=6.75
790 IF G3=13 THEN G4=4.8
800 IF G4<>0 THEN 830
810 !" *ERROR* INSULATION TYPE OUT OF RANGE- RE-INPUT SURFACE"
820 GOTO 640
830 U(Z)=INT(100*(G5/G4/G6/S(Z)))/100
840 G4=0
850 WRITE #1, S(Z), T(Z), U(Z), AS(Z9, Z*10)
860 NEXT Z
870 GOSUB1270!TAB(15), "**** ECONOMIC INPUT INFORMATION ****"
880 !\
890 INPUT #1. PROJECTED FUEL INFLATION RATE (IN DECIMAL) ", B4
900 INPUT #2. YOUR COMPANY'S TAX BRACKET (IN DECIMAL) ", B5
910 !" #3. INTEREST RATE AT WHICH YOU COULD BORROW "
920 INPUT "MONEY (IN DECIMAL) ", B6
930 INPUT #4. THE NUMBER OF YEARS YOU PLAN TO OCCUPY BUILDING ", A9
940 !" #5. DO YOU WANT THE SIMPLE PAYBACK ANALYSIS TO CONSIDER "
950 INPUT "THE RATE OF FUEL INFLATION ? (1=YES 0=NO) ", A5
960 WRITE #1, B4, B5, B6, A9, A5
970 GOSUB1270! "**** ENVIRONMENTAL INPUT INFORMATION ****"!
980 IF A1=2 THEN 1070
990 !" #1. WINTER INPUT INFORMATION"!
1000 INPUT "A. ENTER THE CURRENT COST OF HEAT ENERGY ($/THERM) ", B7
1010 INPUT "B. ENTER YEARLY HEATING DEGREE-DAYS FOR YOUR AREA ", B8
1020 !" C. ENTER THE EFFICIENCY AT WHICH YOU USE HEAT ENERGY (SUGGEST"
1030 INPUT "FOR GAS/OIL = .75 AND ELECTRICITY = .95) ", B9
1040 !
1050 WRITE #1, B7, B8, B9
1060 IF A1=1 THEN 1170
1070 !" #2. SUMMER INPUT INFORMATION"!
1080 !" A. ENTER YOUR CURRENT COST OF ENERGY SOURCE USED FOR"
1090 INPUT "COOLING EQUIPMENT ($/KWH) ", C1
1100 !" B. ENTER # OF OPERATING HOURS A DAY YOUR COOLING"
1110 INPUT "EQUIPMENT OPERATES (HOURS) ", C2
1120 !" C. ENTER # OF DAYS A WEEK THAT YOUR COOLING EQUIPMENT"
1130 INPUT "IS TURNED ON (# OF DAYS/WEEK) ", C4
1140 C2=C2*C4*18
1150 C3=30
1160 WRITE #1, C1, C2, C3
1170 CLOSE #1
1180 GOTO 70
1190 IF FILE("INFIL, 2")=-1 THEN 1200\DESTROY "INFIL, 2"
1200 CREATE "INFIL, 2", 2
1210 OPEN #2, "INFIL, 2"
1220 F$="INSULRUN"
1230 F$=F$+"2"
1240 INPUT "IF YOU WOULD LIKE THE RUN ON PAPER TYPE 1 (IF NOT TYPE 0)", J
1250 WRITE #2, H$, J
1260 CHAIN F$
1270 !CHR$(126), CHR$(28), CHR$(126), CHR$(17), CHR$(Q0), CHR$(Q1)\RETURN
1280 FOR J=1TOQ3\! "-", \NEXT\RETURN
1290 END

```


LISTING 2

```

10 DIM NS(40),A$(30*10),B$(13),S(30), T(30), U(30), O(30), N(30), K(30)
20 OPEN #2,"INFIL,2"
30 READ #2,H$,J
40 OPEN #1,H$+" ",2"
50 READ #1,N$
60 READ #1,A1,A2,A3,A4
70 PRINT #J
80 PRINT #J,TAB(15),"*** *      * *** * * *      * ** * ** *"
90 PRINT #J,TAB(15)," * * * *      * * * *      * * * * "
100 PRINT #J,TAB(15)," * * * *      * * * *      * ** * * ** *"
110 PRINT #J,TAB(15)," * * * *      * * * *      * * * * "
120 PRINT #J,TAB(15),"*** *      * *** * ** * ** * * * ** *"
130 PRINT #J
140 PRINT #J
150 PRINT #J,TAB(5),N$
160 PRINT #J
170 PRINT #J
180 PRINT #J,TAB(10),"THIS PROGRAM ESTABLISHES THE ECONOMIC OPTIMUM"
190 PRINT #J,TAB(10),"FOR BUILDING INSULATION FOR BOTH WINTER"
200 PRINT #J,TAB(10),"HEATING AND SUMMER COOLING CONDITIONS."
210 PRINT #J
220 PRINT #J
230 PRINT #J,TAB(10),"* * * * * PROGRAM INPUT * * * * *"
240 PRINT #J
250 FOR Z=1 TO A4
260 Z9=(Z-1)*10+1
270 READ #1,S(Z),T(Z),U(Z),A$(Z9,Z*10)
280 PRINT #J,TAB(5),"A ",A$(Z9,Z*10)," AREA=",S(Z)," SQ FT",TAB(39),"R VALUE=",
290 PRINT #J,T(Z),TAB(51)," COST/R/SQ FT=",U(Z)
300 E1=E1+S(Z)
310 E2=E2+U(Z)*S(Z)
320 E3=E3+S(Z)/T(Z)
330 NEXT Z
340 PRINT #J
350 E4=INT((E1/E3+.005)*100)/100
360 E2=E2/E1
370 PRINT #J,TAB(10),"TOTAL AREA=",E1," SQ FT R TOTAL=",E4
380 PRINT #J
390 READ #1,B4,B5,B6,A9,A5
400 PRINT#J
410 PRINT#J
420 PRINT #J,TAB(10),"* * ECONOMIC VARIABLE INPUTS * *"
430 PRINT #J
440 -PRINT #J,TAB(5),"WHEN THE BUILDING IS",TAB(40),A9," YEARS"
450 PRINT #J,TAB(5),"AND WHEN THE COST OF MONEY IS",TAB(40),B6*100," %"
460 -PRINT #J,TAB(5),"AND WHEN THE TAX RATE IS",TAB(40),B5*100," %"
470 PRINT #J,TAB(5),"AT A RATE OF FUEL INCREASE OF ",TAB(40),
480 -PRINT #J,B4*100," % PER YEAR"

```

```

1030 N6=N6+O(Z2)
1040 N7=N7+Y*N5
1050 N8=N8+S(Z2)/N(Z2)
1060 IF N4<0 THEN 1110
1070 IF N5=0 THEN 1110
1080 K1=LOG(1-((D1-B4)/(1+B4)*O(Z2)/W/N5))
1090 K2=LOG((1+B4)/D2)
1100 K(Z2)=K1/K2
1110 NEXT Z2
1120 K4=N7-N6
1130 N8=E1/N8
1140 K6=1-E4/N8
1150 IF N6=0 THEN 1230
1160 K7=LOG(1-((D1-B4)/D2*N6/N1/K6))
1170 K8=K7/K2
1180 K9=K6*N1
1190 P1=LOG(1+N6*B4/K9)
1200 P3=ABS(P1)/LOG(1+B4)
1210 IF A5=0 THEN P3=N6/K9
1220 GOTO 1250
1230 K8=0
1240 P3=0
1250 PRINT #J,TAB(5),"FIRST YEAR ENERGY SAVINGS",
1260 PRINT #J,TAB(40),"$ ",INT(K9*100)/100
1270 PRINT#J
1280 PRINT #J,TAB(5),"R OPTIMUM-R VALUE AT PT OF DIMINISHING RETURNS"
1290 PRINT#J,TAB(5),"-----"
1300 PRINT #J,TAB(5),"R AT DIMINISHING RETURN",TAB(40),INT(N8*100)/100
1310 PRINT #J,TAB(5),"WILL GIVE A FUEL COST SAVINGS OF",
1320 PRINT #J,TAB(40),"$ ",INT(N7*100)/100
1330 PRINT #J,TAB(5),"FOR AN EXTRA INVESTMENT OF",
1340 PRINT #J,TAB(40),"$ ",INT(100*N6)/100
1350 PRINT #J,TAB(5),"RESULTING IN A NET SAVINGS OF",
1360 PRINT #J,TAB(40),"$ ",INT(K4*100)/100
1370 PRINT #J,TAB(5),"THE EXTRA INVESTMENT WILL BE PAID BACK"
1380 PRINT #J,TAB(6),"USING THE PRESENT VALUE METHOD IN",
1390 PRINT #J,TAB(40),INT(K8*100)/100," YEARS"
1400 PRINT #J,TAB(6),"USING THE SIMPLE PAYBACK METHOD IN",
1410 PRINT #J,TAB(40),INT(P3*100)/100," YEARS"
1420 PRINT#J
1430 PRINT #J,TAB(5),"R VALUES OF BUILDING SUB-ELEMENTS"
1440 FOR Z4=1 TO A4
1450 Z9=(Z4-1)*10+1
1460 PRINT #J,TAB(8),"A ",A$(Z9,Z4*10),TAB(21),"R=",INT(100*N(Z4))/100,
1470 PRINT #J," WITH A COST=",INT(100*O(Z4))/100," (",INT(10*K(Z4))/10,
1480 PRINT #J," YEAR PAYBACK)"
1490 NEXT Z4
1500 IF A2=0 THEN 1910
1510 PRINT #J
1520 PRINT #J
1530 PRINT #J
1540 PRINT #J
1550 PRINT #J,TAB(15),"INSULATION LEVELS FOR VARIOUS "
1560 PRINT #J,TAB(17),"BUILDING OCCUPANCY LEVELS"

```



```

490 IF A1=1 THEN B$="WINTER"
500 IF A1=2 THEN B$="SUMMER"
510 IF A1=3 THEN B$="WINTER/SUMMER"
520 PRINT#J
530 PRINT#J
540 PRINT #J,TAB(10),"* * ",B$," ENVIRONMENTAL INPUTS * *"
550 IF A1=2 THEN 660
560 READ #1,B7,B8,B9
570 PRINT#J
580 PRINT #J,TAB(5),"WINTER CONDITIONS"
590 PRINT #J,TAB(7),"DEGREE DAYS",TAB(40),B8," PER WINTER"
600 PRINT #J,TAB(7),"TODAY'S COST OF FUEL IS",TAB(40),B7," $/THERM"
610 PRINT #J,TAB(7),"OPERATING AT AN EFFICIENCY OF ",
620 PRINT #J,TAB(40),B9*100," %"
630 IF A1=1 THEN 720
640 READ #1,C1,C2,C3
650 PRINT#J
660 PRINT #J,TAB(5),"SUMMER CONDITIONS"
670 PRINT #J,TAB(7),"OPERATING HOURS OF COOLING EQPMT",
680 PRINT #J,TAB(40),C2," HOURS"
690 PRINT #J,TAB(7),"EQUIVALENT TEMPERATURE DIFFERENCE",TAB(41),C3
700 PRINT #J,TAB(7),"TODAYS COST OF ELECTRICITY IS",
710 PRINT #J,TAB(40),C1," PER KWH"
720 PRINT#J
730 PRINT#J
740 PRINT #J,TAB(5),"THE FOLLOWING OUTPUT RESULTS"
750 PRINT#J
760 PRINT #J,TAB(10),"* ECONOMIC OPTIMUM BUILDING INSULATION *"
770 PRINT #J,TAB(10),"* * BASED ON ",B$," CONDITIONS * *"
780 PRINT#J
790 PRINT#J
800 D1=(1-B5)*B6
810 D2=D1+1
820 D3=1-((1+B4)/D2)^A9
830 D4=D2/(D1-B4)*D3
840 M1=E1\M2=E4\M3=B8\M6=D4\M7=C3
850 GOSUB 1960
860 PRINT #J,TAB(5),"PRESENT VALUE OF A THERM OF ENERGY",
870 PRINT #J,TAB(40),"$ ",INT(100*X)/100
880 N1=W
890 FOR Z2=1 TO A4
900 M2=T(Z2)
910 M1=S(Z2)
920 M9=U(Z2)
930 M3=B8\M6=D4\M7=C3
940 GOSUB 1960
950 N2=S(Z2)*U(Z2)
960 N3=Y*M2/N2
970 N(Z2)=SQRT(N3)
980 IF N(Z2)<M2 THEN N(Z2)=M2
990 N4=N(Z2)-M2
1000 O(Z2)=N2*N4
1010 IF N4<0 THEN O(Z2)=0
1020 N5=1-M2/N(Z2)

```

```

1570 PRINT #J,TAB(2),"BUILDING TIME",TAB(18),"INVESTMENT",TAB(32),
1580 PRINT #J,"AVERAGE BUILDING",TAB(52),"PRESENT VALUE "
1590 PRINT #J,TAB(2),"PERIOD (YEARS)",TAB(18),"NECESSARY($)",TAB(32),
1600 PRINT #J,"INSULATION R-LEVEL",TAB(52),"PAYBACK (YEARS)"
1610 PRINT #J,TAB(2),"-----",TAB(18),"-----",TAB(32),
1620 PRINT #J,"-----",TAB(52),"-----"
1630 FOR Z6=1 TO A3
1640 R1=1-((1+B4)/D2)^Z6
1650 R1=R1*D2/(D1-B4)
1660 R4=0\R5=0\R6=0
1670 FOR Z8=1 TO A4
1680 M1=S(Z8)\M2=T(Z8)\M9=U(Z8)
1690 N2=M1*M9
1700 M3=B8\M7=C3\M6=R1
1710 GOSUB 1960
1720 R2=SQRT(Y*T(Z8)/N2)
1730 IF R2<T(Z8) THEN R2=T(Z8)
1740 K6=1-M2/R2
1750 R4=N2*(R2-M2)+R4
1760 R5=R5+M1/R2
1770 R6=R6+(W*K6)
1780 NEXT Z8
1790 R3=E1/R5
1800 IF R4<0 THEN 1870
1810 Q9=LOG(1-(D1-B4)/D2*R4/R6)
1820 Q9=Q9/LOG((1+B4)/D2)
1830 R7=ABS(LOG(1+R4*B4/R6))
1840 R7=R7/LOG(1+B4)
1850 IF A5=0 THEN R7=R4/R6
1860 GOTO 1880
1870 R7=0\Q9=0
1880 PRINT #J,TAB(6),INT(100*Z6)/100,TAB(20),INT(100*R4)/100,
1890 PRINT #J,TAB(38),INT(100*R3)/100,TAB(57),INT(100*Q9)/100
1900 NEXT Z6
1910 CLOSE #1
1920 CLOSE #2
1930 F$="INSULATE"
1940 F$=F$+",2"
1950 CHAIN F$
1960 X1=0\X2=0\V1=0\V2=0\Y1=0\Y2=0
1970 IF A1=2 THEN 2020
1980 V1=M1/M2*24*M3*.00001/B9
1990 X1=M6*B7
2000 Y1=V1*X1
2010 IF A1=1 THEN 2050
2020 V2=M1*M7*C2/M2/2/12000
2030 X2=M6*C1
2040 Y2=V2*X2
2050 V=V1+V2
2060 W=V1*B7+V2*C1
2070 X=X1+X2
2080 Y=Y1+Y2
2090 RETURN

```


New Life for TDL's Text Output Processor

By A.E. Hawley

Technical Design Labs (Xitan) is no longer in business. This program is presented here for those who have TDL equipment, and for persons who want to adapt their software using the ideas the authors sets forth in this article.

—editor

When you write reports, software documentation, or articles like this, organization and editing of the material is one of the toughest parts of the job. Then there's the final draft; in spite of your hard work, typos still creep in. You correct them. When you think you're finished, you submit your work, and your boss wants "just a few changes."

We who have microcomputers have the problem licked, though. We retrieve the document from mass storage, use software to make as many changes as we want, and let the system printer type a new draft. That's called *word processing*.

In some systems the word processor is a single program which combines all the functions of editing, mass storage access, and printout. Another older approach is the use of two programs: a system editor to prepare or modify the text file, and a text output processor program to print out the formatted copy. Special commands to the text output processor are embedded in the text file; these commands control the formatting of the final copy. This type of word processing was available on some of the early time-share networks and is still available today on many large computers.

Shortly after Z-80 CPU cards became available to the microcomputer community, TDL wrote a text output processor called TOP which was designed for use with those first Z-80 systems. Paper tape was the mass storage device, and the system could be used with a minimum of (expensive) memory and a Teletype for I/O. The text with embedded commands was prepared using the TDL editor which had been released somewhat earlier. The system worked so well that TOP has apparently never been revised.

Adapting these programs to work with cassette tape rather than paper tape was a fairly straightforward task. With a little ingenuity, they could also be interfaced to a floppy disk, as I did with my copy. Eventually, Digital Research made CP/M available; TDL introduced a new editor for use under CP/M and TOP, unchanged except for the necessary CP/M interface provisions.

When I got my copy of TOP for CP/M, I was surprised that no mention of the command format under CP/M was made in the documentation. I suppose it seemed self-evident that TOP should be invoked by using the standard CP/M command structure with the name of a file to be processed as an argument. A quick trial showed that to be true, and I used TOP that way until I began to wonder if any other arguments were permitted.

Some analysis with my Z-80 disassembler soon revealed the command structure: TOP is invoked with a command string like:

```
A>TOP <filename> <options>
```

where <filename> assumes the file extension ".TOP" if no other is given. The <options> are the letters "B" or "D", separated by exactly one space from the filename.

If neither is present, output goes to the printer. If "D" is specified, output goes to a new file on the current disk with the name <filename> and the extension ".DOC". "B" causes output to both the disk and the printer. (Note: A space is interpreted as the end of the option field, so any options following a space in the field will be ignored.)

TOP is a well designed and very useful program — one of the best, in my estimation. Still, there are always a few more features that one could wish for. I use an electric typewriter for my printer, and there are times when I want to use regular sheets of paper instead of fanfold or other computer paper for an attractive, finished appearance.

Have you ever tried to stop a printer (using Control S) exactly at the bottom of a page? My first addition to TOP (long before the CP/M version) was a routine to interrupt printing at the end of a page and wait for a keyboard entry before continuing. That solved the problem of changing paper. The routine uses two characters that may be entered any time that a Control S would be recognized by TOP. One character (H) activates the 'pause' routine; the other (Control H) deactivates it. The Control S function still works normally.

As for the <options>, I really would like to have a free format field in which I could specify any one or a combination of the output devices in any order. And, I would like to have TOP output only selected pages when required. When you have changed page 12 of a 32-page document, you would prefer not to wait through 11 pages of printing to get the corrected page.

The implementation of these ideas was fairly routine, as assembly language programming goes. Several flow diagrams, disassemblies, assemblies, system crashes, and debugging sessions later, the patch listing at the end of this article became reality. The assembly listing is intended to be self explanatory.

What can you do with this information? At the very least, you can now use the options that TOP allows. You could, as I did, assemble the source text, then load the object code directly on top of the TOP program to make all the patches at once. Save the patched code (18 blocks), and you will never have to make the patches again.

Or, if you prefer, you can patch the code one byte at a time using the DDT or ZBUG programs. Note that the assembly listing shows address arguments in the same order (low byte first) as stored in memory. □

Program follows

MEMO

TO: All Corporate Executives

Re: Barter

Date: 1980's

Remember when businessmen weren't afraid to do business?? When goods and services were exchanged at their value? When executives weren't afraid to look eye to eye and conclude a business transaction with fears of inflation?

Will today's corporate executive.....the one who'll still be an executive tomorrow—Consider a million barrels of crude oil for his corporation's goods and services, or maybe airline tickets, or office supplies, or hotel rooms, or computers, or car rentals????

Keep your operating dollars in your company.

Use your company's goods or services to obtain what your firm needs to operate profitably ***without high interest rates!***

Our company began operating on barter and operates on it today with very low cash overhead.

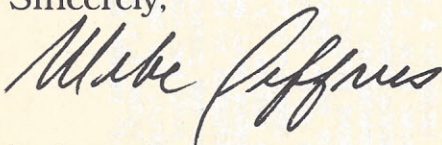
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PROGRAM LISTING

```

      .IDENT PATCH
;
; PATCHES AND ROUTINES TO ALLOW A PAUSE
; AT THE END OF AN OUTPUT PAGE, CONTROL
; OF THE DESTINATION OF THE OUTPUT, AND
; SELECTION OF THE PAGE(S) TO BE OUTPUT.
;
      .PABS      ;FOR HEX FILE
;
; DEFINITIONS
0592      OUTFLG=592H      ;OUTPUT OPTION FLAGS
01BF      PAGENO=1BFH     ;PAGE NUMBER BYTE
0D9D      WRAPUP=0D9DH    ;PART OF .EN CMD
;
; INITIALIZE OUTFLG
0592      .LOC OUTFLG
0592      .BYTE 0
;
; PATCH FOR THE PAUSE FUNCTION
;
0971      .LOC 971H
0971      CALL HPTEST
;
; PATCH FOR PAUSE CONTROL FUNCTION
;
0A4E      .LOC 0A4EH
0A4E      CALL PCMD
;
; THE NEXT CODE SEGMENT REPLACES THE
; ORIGINAL CODE THAT SCANS THE OPTION
; FIELD OF 11 CHARACTERS. THE NEW CODE
; PERMITS ANY OF THE OPTIONS TO BE
; PRESENT IN ANY ORDER IN THE OPTION
; FIELD. 'D' SPECIFIES OUTPUT TO THE
; DISK, 'L' SPECIFIES OUTPUT TO THE LIST
; DEVICE, AND 'C' OUTPUT TO THE CONSOLE.
; 'H' REQUESTS A PAUSE AT THE END OF EACH
; PRINTED PAGE. PAGE NUMBERS ARE FIXED BY
; COMMANDS EMBEDDED IN THE TEXT FILE TO
; BE PROCESSED...P<N> AND -<N1> WHEN
; PRESENT SPECIFY THAT ONLY THOSE PAGES
; WHOSE PAGE NUMBERS FALL IN THE RANGE
; OF N TO N1 (INCLUSIVE) WILL BE OUTPUT.
; THE DEFAULT OUTPUT SPECIFICATION IS THE
; LIST DEVICE. IF 'H' IS NOT SPECIFIED,
; PRINTOUT WILL NOT PAUSE FOR KEYBOARD
; PERMISSION AT THE END OF A PAGE(I.E.,
; 'H' IS THE DEFAULT). THE DEFAULT VALUES
; FOR P<N> AND -<N1> ARE 1 AND 255. FOR
; EXAMPLE, THE OPTION "P3-5" ASKS
; FOR PAGES 3,4, AND 5 TO BE PRINTED.
; "P3-3" PRINTS ONLY PAGE 3, "P3" PRINTS

```

```

; REPLACING THE ZERO VALUE INITIALLY THERE,
; AND ENABLING THE OPTIONS CHOSEN FOR OUTPUT.
; WHEN THE PAGE RANGE IS EXCEEDED, FURTHER
; OUTPUT IS ABORTED BY USING THE .EN
; COMMAND ROUTINE WHICH SUPPLIES OVERHEAD
; FUNCTIONS REQUIRED DURING TERMINATION.
;
; 'HTST' WAITS FOR KEYBOARD INPUT IF BIT 0
; OF THE FLAG IS SET, AND RETURNS WITHOUT
; WAITING IF BIT 0 IS RESET(=0). DURING THE
; WAIT STATE, AC WILL CAUSE AN ABORT TO CPM
;
1225      .LOC 1225H
1225      210F06      HPTEST: LXI H,FPAGE      ;CALLED FROM 971H
1228      3ABF01      LDA PAGENO      ;NEXT PAGE NUM
122B      BE          CMP M
122C      280C          JRZ OUTOK
122E      3821          JRC GO
1230      23          INX H
1231      BE          CMP M
1232      280C          JRZ HTST
1234      380A          JRC HTST
1236      E1          POP H          ;CLEAR STACK
1237      C39D0D      JMP WRAPUP      ;NO MORE TO PRINT
123A      3A1106      OUTOK:  LDA OUTOPT
123D      329205      STA OUTFLG
1240      210E06      HTST:   LXI H,HFLAG
1243      CB46          BIT 0,M
1245      280A          JRZ GO
1247      CD0301      CALL 103H      ;CONSOLE INPUT
124A      E67F          ANI 7FH
124C      FE03          CPI 3          ;AC?
124E      CA0000      JZ 0          ;ABORT TO CPM
1251      3ABE01      GO:     LDA 1BEH      ;REPLACE PATCH INSTR
1254      C9          RET
;
; 'PCMD' SETS OR RESETS THE WAIT FLAG (BIT 0)
; ACCORDING TO THE MOST RECENT KEYBOARD ENTRY.
; 'PCMD1' IS THE ENTRY FROM THE SWITCH SELECT
; ROUTINE, SO 'H' OPTION IS AVAILABLE AS AN
; INITIAL ENTRY OPTION, AS WELL AS DURING
; EXECUTION OF THE TEXT OUTPUT PROCESSOR.
; 'H' SETS THE FLAG, CAUSING A WAIT STATE AT
; THE END OF THE CURRENT PAGE. ANY KEYBOARD
; ENTRY ENDS THE WAIT STATE, AND OUTPUT WILL
; CONTINUE AT THE TOP OF THE NEXT PAGE. THE
; 'H' OR 'AH' CAN BE ENTERED ANYTIME THAT 'AS'
; WOULD BE ACCEPTED.
;
1255      CD0301      PCMD:   CALL 103H      ;CONSOLE INPUT
1258      E67F          ANI 7FH
125A      E5          PCMD1:  PUSH H
125B      210E06      LXI H,HFLAG
125E      FE48          CPI "H"
1260      2002          JRNZ NOSET
1262      C8C6          SET 0,M          ;HALT AT PAGE END

```



```
;ALL PAGES FROM 3 TO THE END OF THE
;TEXT FILE, AND "-3" RESULTS IN PRINTING
;OF PAGES 1,2, AND 3.
```

```
;TOP <CPM FILENAME> [<OPTIONS>]
```

```
;WHERE <OPTIONS>:=D!L!C!H!A!H!P!<N>!-<N>
; <N>:=A DECIMAL NUMBER FROM 0 TO 255
; !:="OR"
```

```
;ON ENTRY, DE POINTS TO THE
;FIRST CHAR IN THE OPTION FIELD.
```

```
05F5          .LOC 5F5H
05F5 211106    LXI H,OUTOPT
05F8 060B      MVI B,11          ;11 CHAR FIELD
05FA 1A        SELECT: LDAX D      ;GET NEXT CHAR
05FB CDE60A    CALL SETOUT        ;FOR CIL!D
05FE CD5A12    CALL PCMD1        ;FOR H!A!H
0601 CD6C12    CALL PCLECT       ;FOR PAGE RANGE
0604 13        INX D
0605 10F3      DJNZ SELECT
0607 7E        MOV A,M
0608 B7        ORA A            ;TEST FOR ZERO
0609 CCF00A    CZ DEFAULT
060C 1804      JMPR 612H
060E 00        HFLAG: .BYTE 0
060F 01        FPAGE: .BYTE 1
0610 FF        LPAGE: .BYTE 0FFH
0611 00        OUTOPT: .BYTE 0
;
0674          .LOC 674H
0674 3A1106    LDA OUTOPT
;
;'SETOUT' SETS BITS IN THE OUTPUT
;CONTROL FLAG BYTE
;
0AE6          .LOC 0AE6H          ;UNUSED CODE AREA
0AE6 FE43      SETOUT: CPI "C"
0AE8 2002      JRNZ S1
0AEA CBCE      SET 1,M          ;ENABLE CONSOLE
0AEC FE4C      S1: CPI "L"
0AEE 2002      JRNZ S2
0AF0 CBC6      DFAULT: SET 0,M   ;ENABLE LIST DEVICE
0AF2 FE44      S2: CPI "D"
0AF4 C0        RNZ
0AF5 CBD6      SET 2,M          ;ENABLE FILE WRITE
0AF7 C9        RET
0AF8 00        NOP
0AF9 00        NOP
```

```
;
;'PAUSE' TESTS THE NEXT PAGE NUMBER TO SEE
;IF IT IS WITHIN THE RANGE REQUESTED. IF SO,
;THE FLAG BYTE IS TRANSFERRED TO 'OUTFLG'
```

```
1264 FE08      NOSET: CPI 8          ;CNTL-H
1266 2002      JRNZ NORES
1268 CB86      RES 0,M            ;DON'T HALT
126A E1        NORES: POP H
126B C9        RET
```

```
;
;PCLECT ROUTINE SETS THE FIRST AND
;LAST PAGE NUMBERS IF THE 'P' OR '-'
;SWITCHES OCCUR IN THE OPTION FIELD.
;DEFAULTS ARE 1 FOR FIRST PAGE AND
;255 FOR THE LAST PAGE TO BE PRINTED.
```

```
126C FE50      PCLECT: CPI 'P'      ;SET FIRST PAGE?
126E 280D      JRZ PCLECT
1270 FE2D      CPI '-'            ;SET LAST PAGE?
1272 C0        RNZ
1273 CD8712    LCLECT: CALL GETNUM   ;GET LAST PAGE NUMBER
1276 2001      JRNZ ..ST
1278 2F        CMA                ;DEFAULT IS 0FFH
1279 321006    ..ST: STA LPAGE
127C C9        RET
127D CD8712    FCLECT: CALL GETNUM   ;GET FIRST PAGE NUMBER
1280 2001      JRNZ ..ST
1282 3C        INR A              ;DEFAULT IS 1
1283 320F06    ..ST: STA FPAGE
1286 C9        RET
```

```
;
;GETNUM GETS A DECIMAL NUMBER FROM THE
;OPTION FIELD AND RETURNS THE HEX VALUE
;MODULO 256 IN THE ACCUMULATOR.
```

```
1287 E5        GETNUM: PUSH H
1288 C5        PUSH B
1289 2E00      MVI L,0
128B 13        NLOOP: INX D          ;POINT TO NEXT CHAR
128C 1A        LDAX D
128D D630      SUI 30H            ;CONVERT TO HEX
128F 380F      JRC DONE          ;NOT A DIGIT
1291 FE0A      CPI 0AH
1293 300B      JRNZ DONE          ;NOT A DIGIT
1295 4F        MOV C,A
1296 060A      MVI B,0AH         ;MULTIPLIER FOR DECIMAL SHIFT
1298 AF        XRA A
1299 85        ADD L              ;MULTIPLY BY 10
129A 10FD      DJNZ X10
129C 81        ADD C              ;ADD DIGIT AT UNITS POSITION
129D 6F        MOV L,A           ;RESTORE PARTIAL NUMBER
129E 18EB      JMPR NLOOP
12A0 1B        DCX D
12A1 7D        ; DV A,L
12A2 B7        ORA A
12A3 C1        POP B
12A4 E1        POP H
12A5 C9        RET
;END
```


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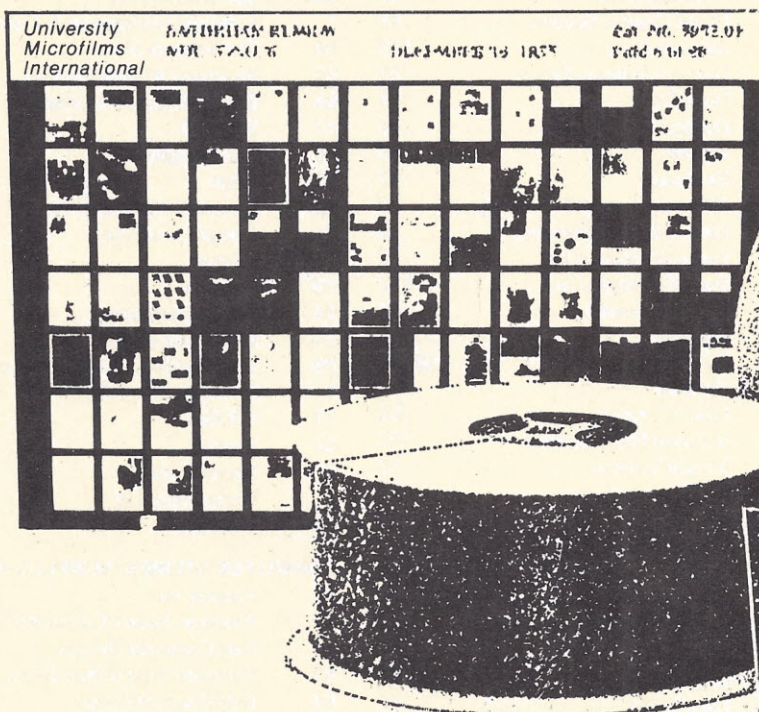
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PHYSICIAN'S APPROACH Continued from Page 73

capabilities and simple programming of the microcomputer. I can't think of a better way to do this than to purchase one of the microcomputers available for home and hobby use, and get some hands-on experience.

A number of small-computer journals and excellent textbooks are available on computer technology and programming techniques. Personal contacts with computer sales personnel, hobbyists and professionals in the field are all fine sources of further information.

I am now aware of several small medical clinics and solo medical and dental offices that have installed computers without the basic knowledge of simple programming techniques and with little appreciation of the capabilities of the hardware configurations. The end result is, at best, a system that is a disaster from its inception and a real liability. This latter situation must account for the horror stories circulating among those contemplating the initial installation of a computer.

Larger facilities can often afford to employ a systems manager to oversee software maintenance and act as an advisor on purchase or repair of hardware. This is an advantage but does not replace the knowledgeable physician who is more aware of his needs than anyone else.

The physician willing to learn the elements of program construction will be able to develop simple programs that will reward him with time saved and will transform his office computer into something that distinguishes it from an elaborate bookkeeping device. □

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Info Inquiry Number	Page	Info Inquiry Number	Page
MANUFACTURERS		47	Microsoft 33
1	A.E.I. 82	48	Mountain Hardware, Inc. 71
2	Addmaster Corp. 84	49	National CSS 77
3	Applied Digital Data Systems IBC	50	New England Business Systems . . . 50
4	Avant Garde Creations 82	51	North Star Computers, Inc. 69
*	BWW 99, 139	95,52	Novation 20, 21
5	California Data Corp. 54	53	OK Machine & Tool 16
6	CompuServe 39	55	Omikron 28
7	Computer Furniture & Accessories . . . 6	56	Osborne/McGraw-Hill 59
8	Computer Pathways Unltd., Inc. . . . 80	57	Payne, Jackson & Associates 22
9	Computronics Inc. 25	*	Personal Computing '80 87
10	Cromemco Inc. 1	58	Personal Software 5
*	Cybernetics Inc. 55	59	Pickles and Trout 29
11	D-G Electronic Development 37	60	Potomac Micro Magic, Inc. 18
*	Data Dynamics Technology . . . 85, 92-93	62	Howard Sams 53
	122-123	*	Shugart 13
*	DDT Best of INTERFACE AGE . . . 109	12,54	Sigma International Inc. 86
13	Datasmith 24		Plus insert between pages 112 & 113
14	Diablo Systems 31	63	Spectronics Corp. 4
15	Digital Graphic Systems 55	*	Software Development & Training . 58
16	dillithium Press 133	64	The Software Store 45
17	Discount Software Group 22	65	Structured Analysis Systems 89
18	Disks Etc. 54	66	Structured Systems Group . . . 14-15
19	Dynacomp 36	67	Supersoft 19
20	Ecosoft 30	68	The Swingline Co. 4
21	Electrolabs 47	69	Sybox 43
22	Electronic Control Technology 38	70	Taranto & Associates, Inc. 12
23	Electronic Specialists, Inc. 58	71	Tarbell Electronics 24
24	Epson of America, Inc. 3	72	Tecmar 52
25	Essex Publishing Co. 112	73	Transnet 86
26	FMG Corporation 47	74	Trionyx Electronics 51
27	FairCom 51	75	Ultra-Violet Products, Inc. 35
28	Folio Books 26-27	76	Universal Business Automation . . . 89
29	Hardside 64	*	University Microfilms 105, 143
30	Heath Company 65	77	V R Data 91
31	Industrial Micro Systems IFC	94	Vandata 129
32	Infosoft Systems 52	78	Vector Graphic BC
33	Innovative Software 11	*	Whitesmiths, Ltd. 38
34	Integrand 29	79	XComp, Inc. 8
*	INTERFACE AGE Subscriptions . 8, 111		
	Insert between pages 16 & 17		
	Insert between pages 112 & 113		
35	International Micro Systems 30	36	Apparat, Inc. 131
*	JS&A 17	80	American Square Computers . . . 119
*	Lifeboat Associates 40-41	*	Beta Computer Devices 118
37	Lobo Drives 23	83	Computer Mart of New Jersey . . . 129
38	M Data Systems 90	84	Data Discount Center 130
39	Charles Mann & Associates 84	85	Disc-3 Mart, Inc. 130
*	Measurement Systems & Controls . . 79	86	Futra Company 117
41	MicroAge 7	87	Microcomputer Technology 131
42	Micro-Ap 83	88	Micro Mike's, Inc. 132
43	Micro Applications Group 90	81,91	Netronics R&D Ltd. 126-127
44	Micro Management Systems 113	92	Orange Micro 121
*	Micropolis 114-115	*	Arkay Engravers., Inc. 142
45	Microsette Co. 64	*	Larks Electronics & Data 142
46	Microsoft CPD 9	*	Pan American Electronics 142
		*	U.S. Robotics, Inc. 142

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